UNITED STATES ARMY

AUGUST 1975

AVIATION DIGEST

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AUGUST 1975 VOLUME 21 NUMBER 8

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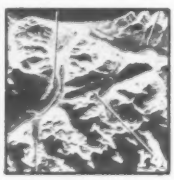

VANGUARD OF FREEDOM
BICENTENNIAL 1775-1975
UNITED STATES ARMY

MG William J. Maddox Jr.
COMMANDER
U. S. ARMY AVIATION CENTER
A major activity of the
U. S. Army Training and Doctrine Command

COL Norman W. Paulson
COMMANDER
U. S. ARMY AGENCY FOR AVIATION SAFETY
A major activity of the
Inspector General and Auditor General
of the U. S. Army

Richard K. Tierney
EDITOR
U. S. ARMY AVIATION DIGEST

ABOUT THE COVER

The DIGEST thanks ARMY LOGISTICIAN for the cover photograph of a CH-47 Chinook with a slingload. It helps set the theme for this issue, which completes the DIGEST'S logistics coverage with the article "Aviation Logistic Support: The Outlook" by MG Erwin M. Graham Jr., commander of the U.S. Army Logistics Center, Fort Lee, VA

The mission of the *U.S. ARMY AVIATION DIGEST* is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

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Articles, photos, and items of interest on Army aviation are invited. Direct communication is authorized to: Editor, U.S. Army Aviation Digest, Fort Rucker, AL 36362.

Use of funds for printing of this publication has been approved by The Adjutant General, Headquarters Department of the Army, 8 April 1974, in accordance with AR 310-1.

Active Army units receive distribution under the pinpoint distribution system as outlined in AR 310-1. Complete DA Form 12-5 and send directly to CDR, AG Publications Center, 2800 Eastern Boulevard, Baltimore, MD 21220. For any change in distribution requirements, initiate a revised DA Form 12-5.

National Guard and Army Reserve units under pinpoint distribution also should submit DA Form 12-5. Other National Guard units should submit requests through their state adjutant general.

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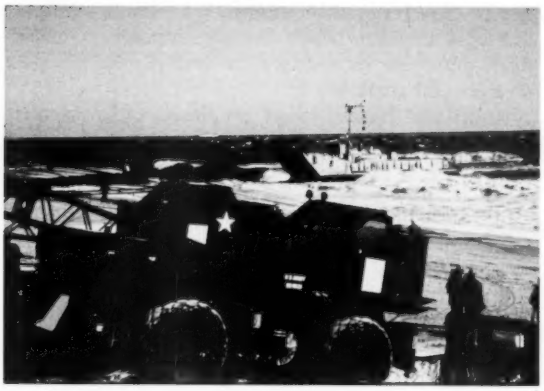

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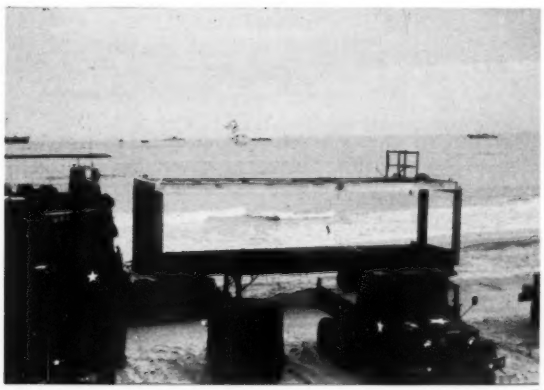

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Aviation Logistic Support: The Outlook

Major General Erwin M. Graham Jr.

Commander
U.S. Army Logistics Center
Fort Lee, VA

TODAY'S LOGISTIC system must be improved to support the complex and sophisticated equipment envisioned in the intense combat of future battlefields. The U.S. Army Logistics Center, Fort Lee, VA, has been developing concepts and doctrine for a standard Army support system to fit the needs of tomorrow.

A number of analyses have been conducted of support operations in past wars and of the lessons learned from the mid-intensity (high threat) type battlefield of the 1973 Mideast War.

Few will disagree when we say that when the U.S. Army fights again, it will probably do so with the resources, both people and equipment, that are available when the conflict begins. We cannot expect a long warning period which would enable industry to gear up for production and which would permit significant mobilization and training of additional forces.

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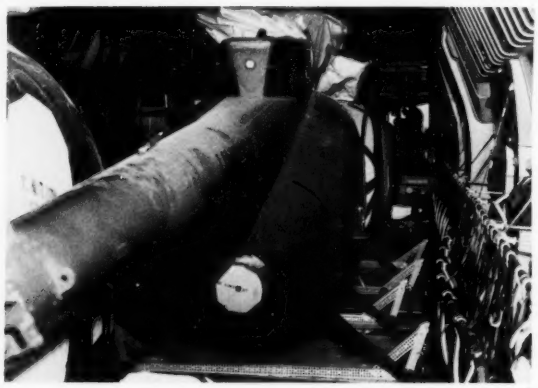
1. Over the beach operations, 100-ton crane, LCU, pier. 2. Flatbed truck rigged for containers. 3. Chinook, flatbed, truck and sideloader for container loading



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If we must fight with what we have, it is imperative that our combat equipment be finely tuned and our men trained to take advantage of all the capabilities of these combat equipments. In similar fashion, the logistic system which directly supports the battlefield must be *modernized, simplified* and *focused* on the combat elements.

Additional factors affect the design of the combat logistic system. Some are obvious; some are not so obvious. They include:

- the increase in the complexity of modern weapons systems
- the tremendous increase in timely intertheater airlift capability with C-5A and C-141 type aircraft
- the increasing use of containers in surface shipment of supplies
- the rapid advances in worldwide communication and automatic data processing equipment which permits near real-time transmission of needs from theater CONUS (Continental United States) and rapid assimilation of great quantities of data as a management tool
- the reduction in management echelons prescribed by the Army Chief of Staff in 1973, eliminating the field army and the Field Army Support Command (FASCOM)
- the continuing pressures for budget reductions within the Department of Defense

Combats units located in the forward areas are by far the most important elements to be supported by the Army logistic system. Dynamic terms are always used to describe the fighting elements of the Army as they strive to achieve a battlefield advantage . . . firepower, mobility, suppression and destruction. The support terms are just as dynamic. I will describe the logistic system using these dynamic terms:

Arm It! Ammunition comes to the theater in a mix of break-bulk and containerships. The containers must be offloaded at ports or logistical Over-the Shore (LOTS) sites by extra-heavy cranes and forklifts and moved to a holding area or directly to an ammunition supply point (ASP) near the division rear boundary by line-haul vehicles. The ASP is the first place where these boxes are opened. Tactical type vehicles carry the basic load of ammunition to the tanks, artillery and aircraft. The more forward the movement, the greater the degree of transport

4. OH-6A Cayuse being loaded into C-141. 5. Handling of palletized ammunition by tactical forklift. 6. 250-gallon tanker trucks for field refueling

mobility required. This resupply of basic loads is a round-the-clock type operation. Darkness is no longer the cover it has been in the past.

Fuel It! Bulk petroleum fuel is transported in large tankers. Using on- and off-shore facilities, these tankers must be pumped out quickly into steel tankage or collapsible tanks ashore. The fuel is moved forward as rapidly as possible using pipelines, flexible hoselines or large tanker trucks and railroad cars. The closer to combat, the more flexible and resourceful the Fuel It system must be. Compact and mobile vehicles able to traverse rough terrain day and night are needed to get fuel to the helicopters, tanks and other combat equipment wherever they may be. Helicopter transportable fuel containers are also used to move fuel into the forward areas.

Aviators must be familiar with forward area refueling and rearming point (FARRP) operations. It is considered the normal support and is an effective technique to maximize available aviation assets. The support system must be able to provide whatever is required to permit the effective utilization of this technique. This was well covered in the article "His What Is Hot To Trot? His FARRP, Man!" by Colonels Charles N. Allgood and George J. Merklinger in last month's ***AVIATION DIGEST***. Even if ammunition and fuel have to be airlifted to a forward point, combat effectiveness is increased by allowing more time on station and more ordnance on target. The same principles which apply to FARRPs for aviation units also are applicable for other weapons systems such as tanks.

Fix It! With limited resources, equipment must be kept operational as long as possible. To get it done quickly, the fixing must be done as far forward as possible. Some modifications are being made to the support function with respect to aviation. Additional responsibilities, formerly at direct support level, are being placed with aviation units at their forward bases. For more complex maintenance tasks, an intermediate support capability, which includes many operations previously performed in aviation general support units, will be available in division rear areas. One of the major features of a new support system being studied is the establishment of corps technical centers oriented toward combat systems. These centers concentrate the best technical talents of the corps in a single organization. An aviation center is one of the six type centers to be established. The aviation center concept is consistent with current efforts to restructure aviation maintenance to three levels. The U.S. Army Aviation Systems Command (AVSCOM) already has recog-

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7, 8 and 9. FARRP operations

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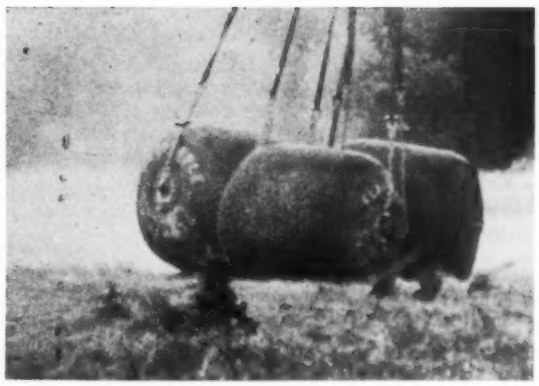

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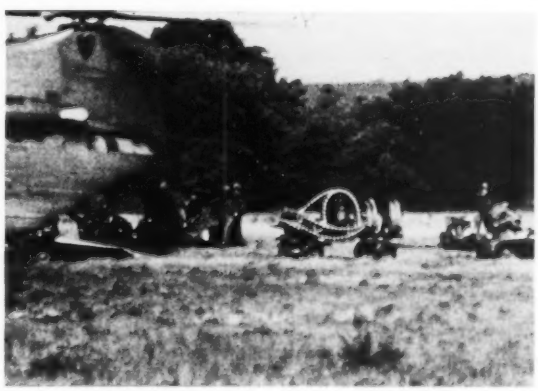

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. . . the raid is what we were to do. It was not completed. The air mission commander, acting as a weather reconnaissance ship, left the pickup zone (PZ) first. He crossed the forward edge of the battle area (FEBA) before going IMC (instrument meteorological conditions). Fortunately, he was able to return to the PZ. The heavy rain began at sunset as the aircraft left the company laager area for the PZ. The rain was so heavy that the flight had to slow to 40 knots and the pilots had to turn on their aircraft's windshield wipers so that they could see the other aircraft in the formation. Visual flight rules (VFR) conditions were recorded again at about 1000 hours the next day. The pathfinders, aggressors and controllers were in very wet positions in the objective area. Another difference was that the CH-47 carried three 500-gallon blivets of fuel. Less than 1,000 gallons was needed, therefore, ammunition could have been carried. Fuel and ammunition in the same aircraft create peacetime administrative excitement. I doubt that two CH-47s would be sent on a raid of that type to segregate the loads during combat. An item not actually done in the exercise was aerial wire laying. The task is being explored now. I chose not to speak of the uncompleted portion of the raid because that fact would have detracted from the flow of this article.

THE NIGHT AIR ASSAULT raid was launched from Fort Hood, TX, to seize enemy missile guidance equipment at Camp Bowie, TX, 100 kilometers away. Its purpose was to provide an interesting training vehicle that would culminate the company's summer high threat readiness training.

During the spring the average flight experience of the unit's aviators dropped from more than 1,500 hours to less than 800 hours. Many of the combat and the Modern Army Selected Systems Test, Evaluation and Review (MASSTER) test-experienced pilots had departed. In their places were 17 aviators with less than 300 hours of flight time. . .among this number were two first lieutenant flight platoon leaders. Fortunately, a cadre of nine pilots in command remained.

In designing a training program the company sought to prepare for the most difficult types of missions it could expect to receive in a mid-intensity (high threat) war. MASSTER testing experience and reports of airmobile successes in the 1973 Mideast War convinced the pilots that assault helicopter company operations in a high air defense threat environment were feasible. Examples of such actions are the Syrian capture of Mount Hermon by air assault and the Egyptian helicopter insertion of ambush parties near three key Sinai passes. Our task was to learn how to perform similar missions well. For this purpose a night air assault raid scenario was chosen as the training theme.

Raids characteristically require the careful planning, knowledge of the enemy, combined arms coordination, stealth, surprise, shock action and precise execution that will be essential in a mid-intensity war. The need for this variety of judicious employment of our assets was stressed by the agregate loss of more than 2,000 tanks and 570 aircraft during the Mideast War.

In emphasizing night operations the company expected to learn to perform the most challenging missions while maintaining the contention that *if we can do it at night, we can do it any time.* To ensure balance across the company, appropriate parallel training was conducted. These subjects included flight leading, liaison officer duties, fire planning, field maintenance, camouflage techniques, ground radio techniques, local security procedures and field flight operations duties. In further describing the 100 kilometer raid, many of these essential concurrent actions will be presented because of their relevance. A good flying company that does not properly perform its many passive air defense responsibilities in a high threat environment should be considered ineffective. Without careful attention to detail such units can expect to lose quickly more aircraft on the ground than in the air to the enemy.

Battle Captains: A warning order began the raid 10 days prior to launch. It was issued early so that

A 100 Kilometer

Night Air Assault Raid

Major Curtis J. Herrick Jr.

S-3 2nd Brigade
1st Calvary Division
Fort Hood, TX

A sergeant engaging a target with Redeye after he has been alerted by the TADDS box

the flight platoon leaders, or battle captains, who were expected to be able to perform this type of mission in combat would have time to plan. Their duties in a mid-intensity war are considerably more demanding than were operations in the Republic of Vietnam. With the sophisticated enemy air defense, the air assault task force commander will be unable to direct the action from a circling command and control ship as he did in the past. If he desires to participate in directing the battle, he must follow the formations in terrain flight and land as necessary with his control aircraft in the objective area in order to maintain communications. Repeated circling of a battle area even in terrain flight is not prudent. Now it is the young battle captain who must find the objective in the dark, control fires, react to the enemy and lead the flight to the ground. Considerable training is required to develop and maintain these skills.

Company Night Training: In preparation for the raid the company conducted an extensive night flying and flight leader training program. Four-hour low level night formation training flights were conducted twice a week. These five to eight aircraft missions were habitually flown across the sunset. In this manner the newer aviators could brush up on their formation flying techniques while transitioning into night flight.

Usually new aviators were used as crewchiefs at night. This technique allowed the limited number of crewchiefs to be freed for maintenance the next day since their need for compensatory time was avoided. The new aviators then switched the pilot's duties during the evening. From this procedure they were able to receive more but somewhat shorter training reinforcements in the challenging and sometimes frightening night low level formation flying.

Each training period was begun with an operation order presented by the air mission commander and flight leader. The platoon leaders were required to perform both duties in order to develop them as battle captains. Their operations orders were the product of normal troop leading procedures emphasizing the reverse planning sequence in developing the five traditional plans of an air assault operation.

For procedural standardization with other units, the U. S. Army Infantry School "Airmobility Handbook" and the division "Tactical SOP" were carefully followed. A joint training period with infantry company leaders was conducted with the flight platoon leaders. This training included classroom instruction, a command post exercise and single aircraft flights along the routes planned in practical exercises. From this experience the budding air assault task force commanders and air mission commanders grew to appreciate each other's requirements while standardizing their operations.

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The MISSION Is SUBDUED

CPT Chesley Auten WO1 Douglas O. Jones

CPT Auten was assigned to Alpha Troop as operations officer and WO1 Jones as an attack helicopter pilot in Braveshield VI

IN THE PAST few years recognition of the enemy threat has spawned an increased awareness of the need to develop tactics and equipment that can survive and win on the high threat battlefield. Along with this thinking, camouflage is receiving much more attention in Army aviation circles. Patterns are appearing on aircraft—a new type of netting has become available—and experimentation with aircraft covers is underway.

Application of camouflage technology is filtering down to the small unit. Prior to Braveshield VI (the attack helicopter squadron's first desert training exercise) in 1973, Troop A, 7th Squadron 17th Cavalry of the former Air Cavalry Combat Brigade (ACCB),

Camouflage paint obscures the C&C (command and control) bird at the forward CP (command post)

Desert camouflage is a tricky problem for which training manuals offer very little assistance, but ingenuity and hard work made the difference in Braveshield VI. [*Editor's comment: The camouflage was even more effective in the original color photographs!*]

Tactical operations center (TOC) with antennas cleverly disguised as tall yucca plants

A system of highlights and shadows effectively blended the mess truck with the surrounding terrain

Vehicles had to be camouflaged as vegetation, and vegetation was sparse

had made only nominal efforts toward camouflage. A general purpose (GP) medium tent disguised in light foliage and casually draped with the traditional netting was considered to be camouflaged. The sparsely vegetated flatness of the Fort Bliss, TX, desert, however, immediately made the requirement for effective camouflaging painfully obvious.

Desert camouflage is a tricky problem for which training manuals offer little assistance. Nonetheless, the ingenuity and hard work of Alpha Troop were so effective that aircraft often had difficulty finding their own refueling points; their mess truck was dusted down by aircraft with some regularity; and one assistant division commander who searched the area low level was unable to find the command post.

Alpha Troop was a relatively new unit, with no extensive experience in desert camouflage. Methods used by its members were mostly trial and error. They began by dispersing their 21 vehicles and 28 aircraft over a 3 square kilometer area with a detail formed for supervision. Since the vehicles would have to be camouflaged as vegetation, and vegetation was sparse, the trucks were positioned to have a minimum of 100 meters separation. The size and intended use of each vehicle were taken into consideration as camouflage positions were sought. Caution was taken while positioning the vehicles to ensure that no definite pattern or line was created. Since a compromise had to be struck between

concealment and function, each type vehicle presented a unique problem. The mess truck, for instance, had a markedly high profile and thus was positioned at the bend of a dry creek to lower its profile 4 feet. As the creek was significantly wider at this point, the truck was positioned adjacent to the bank and camouflaged to give the appearance of a mound which the creek was flowing around. When the time came to apply the netting, it was discovered that it had been rigged for a wetter climate and lighter bunting was not available. This was compensated for by covering the dark net with lighter weeds and grass, creating a system of highlights and shadows which effectively blended the structure with the surrounding terrain. This system was quite effective for all but the fuel trucks.

There was a need for a 2½-ton truck to make mess and supply runs and still be camouflaged in such a way that it could be driven in and out of the area without having to disturb the camouflage structure. A small draw was enlarged with shovels to house the truck and then covered with a net supported by tent poles. The net was dropped to the ground in front of the truck. By lifting the front of the net, the vehicle could be driven in and out with a minimum of effort.

The fuel tankers also presented problems. They had to be positioned in a way that aircraft could be hot refueled without moving the truck or disturbing the camouflage. Clumps of brush were located and a tanker was positioned in the midst of each. Then a net was strung over the tanker to fill the area between the brush. The hoses were reeled out to a landing area and covered to prevent sighting from the air.

Initially, the responsibility for camouflaging had been given to the crewmen of each vehicle. They were told to back off between 25 and 50 meters from time to time as they worked in order to determine what would be necessary to further blend their netting with the surrounding terrain. When their camouflage was found to be less than what was desired, the operation was reorganized. Two jeep crews with binoculars to observe the work were dispatched—one to the high ground 3 kilometers southwest and the other to the high ground 5 kilometers north. The vehicle crews were then combined to form one detail. An officer was placed in charge and provided with a PRC-77 radio to receive instructions from the distant jeeps. This additional perspective enabled the detail to convert the draped netting into effective camouflage.

The observers quickly discovered that any sharp angles or points created by the tent poles supporting the net would give the whole structure a manmade appearance. To compensate, tumbleweed was found and strategically placed to obscure these protrusions. They also determined that the netting was ineffective unless it was given a shallow angle and extended all the way to the ground, thus giving the appearance of the small sand hummocks found throughout the desert.

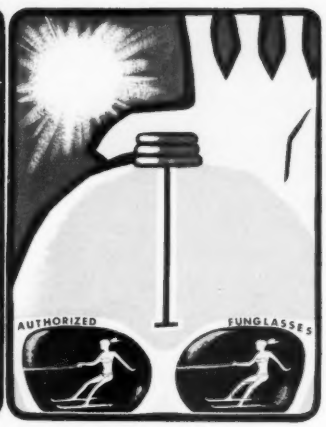
Since a GP medium could not be concealed on the desert and sufficient netting was not available for numerous small tents, personnel were required to sleep in aircraft, vehicles or under netting already in use. Operations section personnel worked from a 5/4-ton truck and beneath the netting which surrounded it. Their antennas were cleverly disguised as tall yucca plants.

The troop's aircraft were positioned much in the same fashion as the vehicles with consideration to assure platoon integrity but camouflaging the aircraft posed a more difficult set of problems. The main rotor and vertical stabilizer were too tall to include under the netting and sufficient low ground was not available to conceal 28 aircraft. These items had to be left exposed. Notwithstanding, when the fuselage and tailboom were properly netted, the aircraft outline was sufficiently interrupted so that it was not readily visible from a distance.

The pattern painting already present on the aircraft assisted greatly in obscuring the exposed portions. The main rotors were secured parallel to the ground and 45 degrees to the aircraft fuselage in order to lower the profile and provide a symmetrical outline not visible from the air. An unwillingness to sacrifice aircraft scramble time prevented adding foliage to the netting, but the experimental net which had been issued specifically for aircraft use was dense enough that no silhouette was visible through it and canopy glare was well cloaked. If the net was extended for a short distance from the aircraft and draped over the surrounding brush, contours could be developed which closely resembled a brush-covered dune. The aircraft, however, were never as effectively camouflaged as the ground vehicles.

Effective camouflaging is not a simple endeavor. Netting and foliage are a good beginning, but simply shrouding equipment (which is sometimes effective for breaking outlines) will not truly blend equipment into the terrain. Since each type of terrain calls for a unique style of camouflage, only careful observation and ingenuity will lead to good camouflage.

VIEWS FROM READERS



Sir:

Request the information . . . concerning the new TRADOC Pamphlet 350-34, Educational Video Tape Catalog, be published in the DIGEST.

In concert with the Army service schools, the Training Aids Management Agency has compiled a catalog which lists and describes educational video tapes available to Army trainers. The video tapes selected for inclusion in the new catalog were selected especially for Army National Guard and U.S. Army Reserve training. Section D of the catalog lists video tapes pertaining to aviation which were produced by the U.S. Army Aviation Center (USAAVNC). Information about how to obtain the video tapes listed is provided in the catalog.

A copy of the catalog, or additional information about the new catalog, is available from Training Aids Services Officer, USAAVNC, Fort Rucker, AL 36362, or by telephone AUTOVON 558-2116/2620; the commercial prefix is 255.

COL G. B. Howard
Commander
Training Aids Management Agency
Ft. Eustis, VA 23604

Sir:

The NOMEX flight suit has been with us for several years and most of us have heard about everything that can be said about it, both good and bad. Most of us willingly accepted the two-piece NOMEX and others submitted reluctantly to its presence.

There is, however, a new NOMEX in the making which will replace the existing two-piece NOMEX. As always it will take time to make the change-over and deplete the supply available, which means the old NOMEX will probably be with us for awhile along with its problems.

One of the problems—the one which "bugs" me the most—has to do with the zipper on the fly of the trousers: The darn thing will not stay up. One suggestion is to use a paper clip to anchor the top zipper in place, but this involves some intricate work and could be dangerous.

There is another solution which is much simpler to devise and more convenient to use. Both zippers on the fly of the trousers have attached a tab approximately 2½ inches long. This tab is a piece of nylon ribbon which has been folded and sewn close to the zipper to form the tab. If the two free ends of the ribbon on the top zipper are sewn together it will form a loop which can then be placed over the button at the top of the fly of the trousers prior to buttoning. This will anchor the top zipper and prevent it from slipping down. The bottom zipper can still be used for "stand-up" type activities and the top zipper with the loop can be removed easily for complete removal of the trousers.

Hopefully with the introduction of the new NOMEX this problem will not exist. In the meantime, this suggestion may help eliminate a frustrating and sometimes embarrassing problem.

Major Edwin R. Clubb
U. S. Army Aviation Center
Fort Rucker

NEW WARNING LIGHT

a drugstore hazard

CPT Bruce Klosterhoff, M.D.

There once was a pilot named Sam,
Who awoke feeling not worth a damn,
He treated himself,
And got put on the shelf,
'Cause he flew and wound up in a jam.

Like anyone else, Army aviators often can be found wandering through a drugstore sneezing, staring through watery eyes and wiping their dripping noses, exhorted by wives or friends to "try this" or "take something for that." Most physicians have large enough patient loads that they are grateful not to have their waiting rooms jammed with common colds. Not so with the flight surgeon—for over-the-counter drugstore remedies, and not just cold preparations, contain a variety of chemical compounds that are not compatible with flying proficiency and safety.

Because they are so widespread on the cold and sleep preparation market, the most dangerous group of chemicals is the antihistamines. Chlorpheniramine, methapyrilene, pyrilamine and phenylpropanolamine are examples of antihistamines contained in many well-known medications sold over the counter. Hoping that it will simply dry up his drippy nose and bleary eyes, the pilot with a cold may take one of these medications, but he may also experience the side effects of these compounds which include sedation, dizziness, incoordination, blurred or double vision, nausea and vomiting—any of which might precipitate an aircraft accident or incident.

In addition to the antihistamines, some medicines for the common cold contain a group of chemicals known as the belladonna alkaloids which have a drying effect on irritated mucous membranes of the nose and respiratory tract. But they also may exert dangerous effects upon the aviator's eyes. They dilate the pupil of the eye and paralyze the ciliary muscle of the lens which may cause the person to experience photophobia (an inability to face bright light) or also blurring of his near vision. Either effect could severely impair the aviator's performance.

The aviator who suffers from mild hay fever may seek to control his symptoms and hide his problem from the flight surgeon by resorting to one of many allergy preparations which also are available without a prescription. Some contain a mixture of our old friends, the antihistamines; and others contain, among other chemicals, the barbiturate phenobarbital with its dangerous sedating effect.

Other hazardous but interesting medicines are the nerve tonics, which the up-tight aviator might take to help him through an IG inspecton or an instrument check-ride. At least one well known medicine is a mixture of bromide salts, an old sedative once used in the treatment of epilepsy. Its long term use may result in a form of chronic poisoning called bromism in which the subject suffers from mental and neurological disturbances such as confusion, irritability, motor incoordination and even coma.

The most dangerous medicine of all is the one that is prescribed by a physician for someone who then, with good intentions, offers it to an aviator friend as a sure cure for what ails him. The catastrophic possibilities are unlimited—one just might treat his cold with a heart pill, a sleeping capsule, a tranquilizer or a hormone that could suddenly incapacitate a pilot.

To the pilot: Utilize your flight surgeon. Let his office be your drugstore. Over-the-counter remedies are effective and can be safe *if taken as prescribed,* but leave the prescribing to us. The old adage should be gospel for the aviator: He who treats himself has a fool for a patient and a physician.

To the flight surgeon and the MEDDAC commander: We must continually strive to gain the trust of our aviator patients so that they will come to us for care, knowing that if grounding is necessary, it's medically indicated and in their best interests. We must make ourselves available and accessible, preferably at a flight line dispensary. If the pilot is forced to drive miles to the hospital, only to wait hours to see a flight surgeon, his human nature is likely to blind him to that warning light, Drugstore Hazard.

Aviation Center Symposiums

John Marusich
Staff Writer

Last month the U.S. Army Aviation Center, Fort Rucker, hosted the first of three consecutive monthly symposiums. They are intended as mediums for the exchange of information and ideas among developers, manufacturers and users of Army helicopters.

Upper Left: MG William J. Maddox Jr., commander of the U.S. Army Aviation Center, opens the Staying Power Symposium at Ft. Rucker. Lower Left: Dr. Jim Kishi, U.S. Army Aviation Test Board technical director, presents a summary on anti-ice/de-ice systems

The theme of the July conference – staying power – emphasized the need for Army aviation units to improve their ability to sustain around-the-clock combat operations. Objectives of the symposium encompassed.

- Gaining cognizance of current aviation equipment, tactics and training that contribute to increased staying power for Army aviation
- Identification and collation of major deficiencies/operational problems
- Provision of an overview of near-term equipment for the conferees to consider
- Expression of immediate military needs

The nearly 200 persons attending represented the aviation industry, civilian and military research activities and military personnel serving in key aviation positions.

Three main topics important to staying power, and on which the symposium centered, were tactical aircraft instrumentation; tactical aircraft lighting and anti-ice/de-ice systems. Formal presentations were made on the subjects followed by open discussions in the general assembly during the first two conference days.

On the third day, three individual discussion groups were organized for the major topics. These specialized groups then addressed the ramifications concerning specific aspects of instrumentation, lighting and icing. Many of these systems incorporated into today's helicopters were designed for fixed wing aircraft and function effectively only in forward flight. Modifications, improvements or adoption of new instruments and systems will be necessary if the helicopter is to perform decisively with the combined arms.

Major General William J. Maddox Jr., Aviation Center commander, pointed out during his welcoming remarks that both aviation doctrine and training are improving. But he cited equipment in Army aircraft which is outdated and does not perform functions necessary to permit modern combat tactics around-the-clock. What symposium participants learn and how they react to it will directly affect the immediate future of Army aviation.

Presentations made during the conference are shown in the figure on the opposite page.

This month the Aviation Center has hosted a Tri-Service 2.75 Inch Rocket Symposium. Representatives from the U.S. Air Force and U.S. Navy attended because of their continuing interest in the aerial 2.75 inch rocket. The future of the rocket for Army aviation is being determined by the Selective Effects Armament Subsystem (SEAS) study in progress at Fort Rucker.

The National Security Industrial Association will conduct a symposium on the 9th, 10th and 11th of next month at Fort Rucker with regard to Outfitting Army Aviation Units In A High Threat Environment. The subject is extremely important in that new Army aviation tactical concepts require novel approaches for helicopter hardware.

In future issues the *DIGEST* will furnish readers with additional coverage of topics discussed in these symposiums.

Staying Power Presentations

U. S. Army Aviation Center

- Threat
- U.S. Army Aviation Center Night Training Test (Nighthawk)
- Tactical Scenario
- Tactical Instrumentation

U. S. Army Electronics Command

- Navigational Systems
- Optic-4, stabilized terrain optical position sensor (STOPS), experimental vehicle avionics research (EVAR)
- 4Q Flight Director
- Terrain Contour Matching (TURCOM) Navigation System

U. S. Army Aviation Systems Command

- Future Developments Instrument Displays
- Instrument Lighting to Enhance Readability and Compatibility with Night Vision Devices

U. S. Army Aeromedical Research Laboratory

- Problems of Cockpit Illumination
- Modifications to Cockpit for NVG Compatibility/Reflection Reduction

U. S. Army Aviation Test Board

- Around-the-Clock Operations

Boeing Vertol

- Refined Cockpit
- Research of Ice Protection Systems Including Boeing UTTAS

U. S. Army Airmobility Research and Development Laboratory

U. S. Army Aviation Engineering Flight Activity

- UH-1 Test of Heated Rotor Blade With Shield

Indiana University

- Vision In The Aviation Environment

LTV Corporation

- Cockpit Lighting/Pilot Night Vision Study

Naval Aviation Systems Command

- Rotor Tip Lights

U. S. Army Human Engineering Laboratory

- Improved Lighting System With NVG/Effects of Cockpit Lighting On Exterior Vision

Bell Helicopter

- Mechanical De-Ice Concept for Rotor Blades

Sikorsky Aircraft

- Sikorsky Icing R&D

Kaman Aerospace Corporation

- AH-1Q Rotor Blade De-Icing Research

The Mohawk Meets New Challenges

CPT Richard P. Wolfe
U.S. Army Electronic Proving Ground
Fort Huachuca, AZ

IT WASN'T LONG AGO that the cover of darkness was no longer secure to the elusive enemy in Southeast Asia. Each night the low-pitched drone of an aircraft could be heard above the valleys and plains seeking out and reporting activities which used to be camouflaged by the coming of night. The OV-1 Mohawk, using side-looking airborne radar (SLAR) and infrared line scanner (IR), could pinpoint vehicle movement and "hot" targets for tactical intelligence as well as timely direction of tactical air and ground fires. During daylight hours camera systems were used for damage assessment, route and area reconnaissance. The U.S. Army can be extremely proud of the records of success of this aircraft and its crews.

Based on experience gained during Southeast Asia operations, ongoing improvements have been made to the Mohawk aerial surveillance systems. Greatly improved SLAR and IR systems now are being utilized, as well as an extremely precise navigation system which enhances target location accuracy. These improvements are available in the new OV-1D airplane. Conversions of the older models to the OV-1D are underway.

During the past several years a new challenge has given the Mohawk an opportunity to demonstrate a number of new applications in the fields of geology, topography and hydrology.

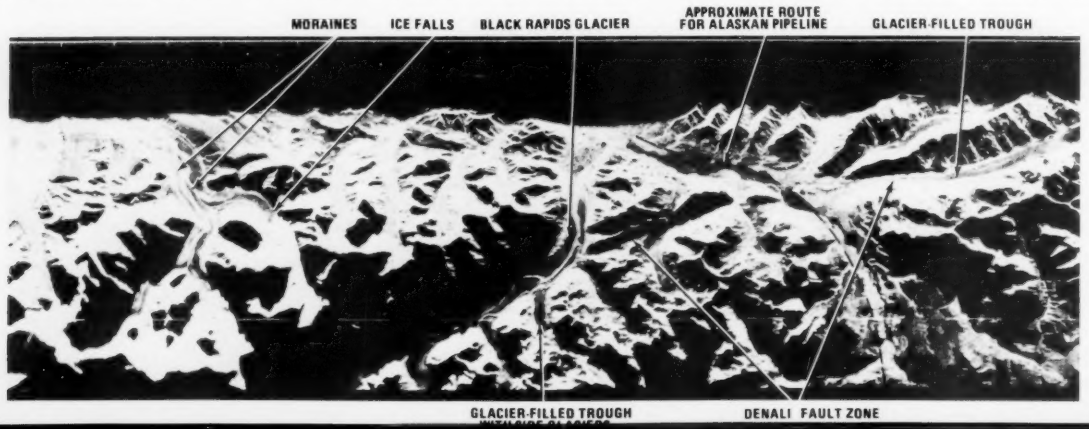
The U.S. Army Corps of Engineers requested OV-1D SLAR support in California to evaluate the system for use in geological studies. Mohawk aircraft were provided to the Corps of Engineers to demonstrate SLAR during training missions. The results proved that SLAR could be used as an excellent tool for mapping the surface structure of the earth. An inherent capability of SLAR is that it can operate in most weather conditions, day or night, and can map much broader swaths from the aircraft than with camera systems. It also has the capability of "seeing" much more of the surface than with conventional photography, regardless of the amounts of vegetation coverage. These first training missions also demonstrated the capability of mosaic mapping by SLAR of large areas at relatively large scales, 1 to 250,000.

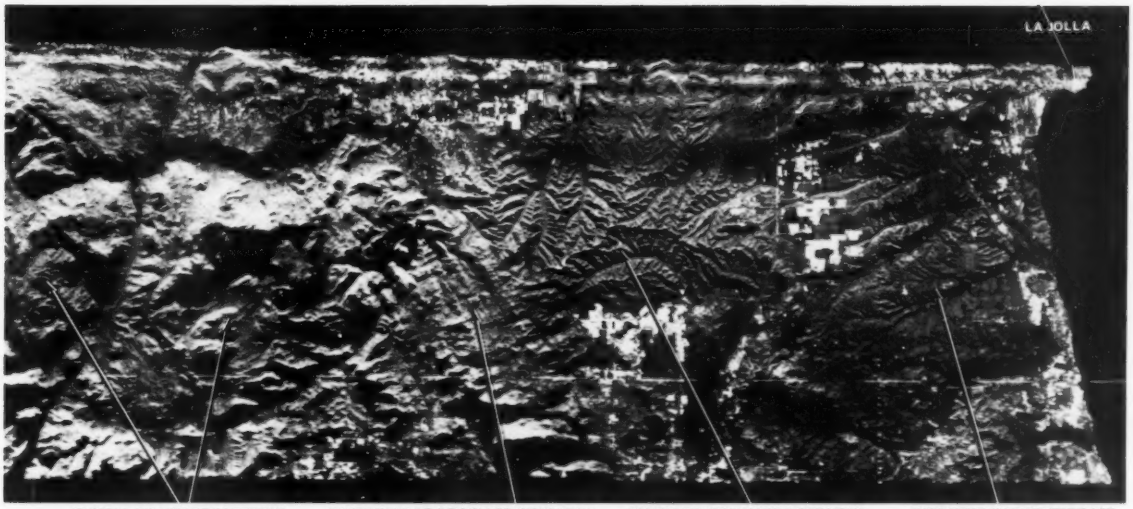
Due to the success of these demonstrations, additional targeting was requested. Areas around dams and reservoirs were of primary interest. It was noted that the SLAR could see fractures or linears in the earth's surface that were difficult to find with photography and ground inspection. These linears indicated many things to the geologists, some of which pointed out areas of unstable conditions which may prove detrimental in the construction of dams, roadways and bridges.

In areas where structures were already standing, SLAR imagery may indicate weak spots where additional or corrective measures could be planned to prevent any problems resulting from slight shifts in the earth's crust, such as during earthquakes.

The success of these first missions in 1972 prompted the Corps of Engineers to request additional OV-1 support for the investigation

OV-1D aircraft provided this imagery from 19,000 feet along the Alaskan pipeline route. The terrain here is very rugged as indicated by the radar shadows. The crest elevations of mountains vary from 10,000 to 16,000 feet




LA JOLLA
TYPICAL DRAINAGE PATTERNS DEVELOPED IN INTRUSIVE IGNEOUS ROCKS
RECTANGULAR DRAINAGE INDICATIVE OF METAMORPHIC ROCKS
DENDRITIC DRAINAGE INDICATIVE OF SEMI-CONSOLIDATED FORMATION
DISSECTED MARINE TERRACE

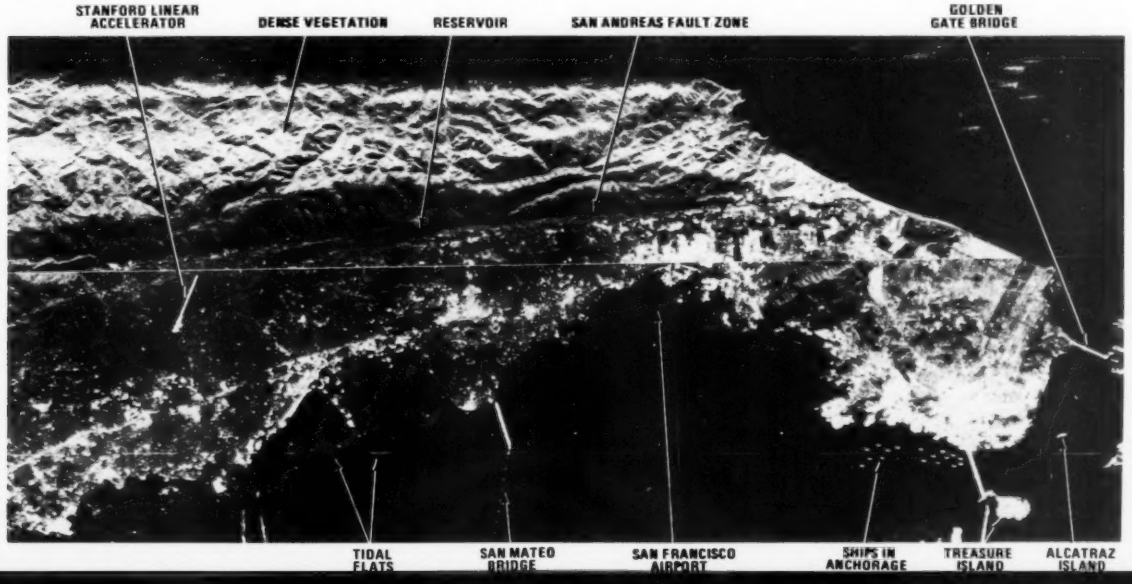
This imagery at La Jolla, CA is a classic example. Because of the controlled illumination of the target by the SLAR the features on the surface can be enhanced to give the geologist a better look at the topography of the area

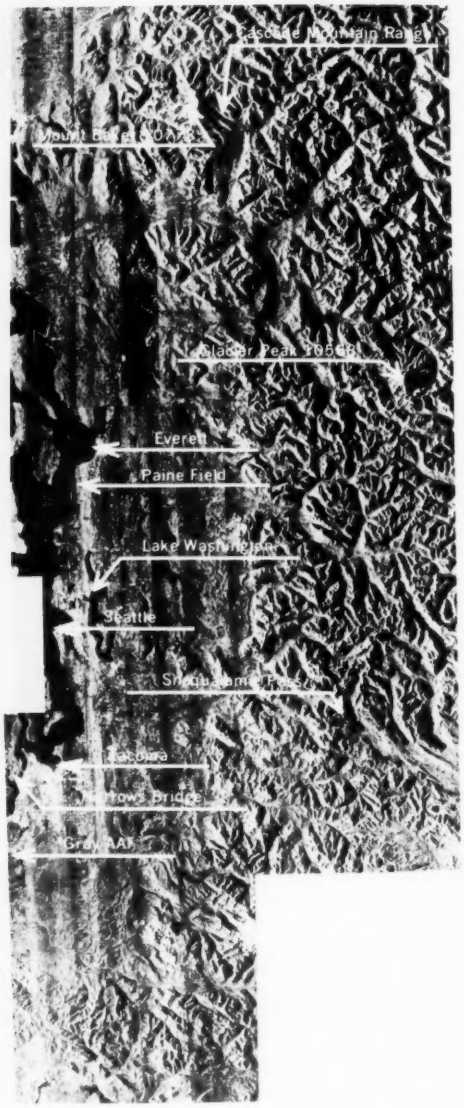
of numerous areas within the corps responsibility. In the months that followed, OV-1D aircraft successfully flew missions in Alaska, Montana, Washington state, California, Colorado and Texas. The largest SLAR target flown to date is 48,000 square miles of area around the Fort Peck Dam and Reservoir in northeastern Montana. Two OV-1D aircraft flew 90 hours in the accomplishment of this target. High winds at altitude caused some problems in tracking; however, parallel flight tracks of more than 150 nautical miles each were put together to form a mosaic map at a scale of 1 to 250,000. The Corps of Engineers was quite elated at the results of this target; it provided an excellent demonstration of the precise tracking capability of the Mohawk using the inertial navigation system. Preliminary analysis of the imagery revealed a number of linears in the earth's surface previously unknown and unmapped.

It must be noted that the SLAR system is not the answer to all aerial surveillance problems. But its unique capabilities of broad coverage and near all-weather operation, as well as its ability to procure excellent terrain mapping information, gives the investigator a wide overview and an opportunity to pinpoint areas for more thorough investigative studies.

In April 1973 torrential rains caused great damage to the flood control system and property surrounding the Missouri, Mississippi and Illinois rivers in the central United States. The Corps of Engineers requested SLAR coverage of the area around St. Louis, MO, during initial flood cresting. The

This imagery was flown over San Francisco on a training mission in Feb 72 at 0230 hrs through 100 percent cloud cover. The 3-dimensional like view of terrain features proves an invaluable aid in studying the features of the area





This radar image was made by flying successive flight lines spaced 10 km apart. It was flown at 18,000 MSL and gives a good idea of the rugged terrain of this area

weather was extremely poor with low ceilings and heavy rainfall, making aerial photo inspections of the area almost impossible.

An OV-1D aircraft flew the area with SLAR and obtained some very good quality imagery in spite of the poor weather. The SLAR imagery very clearly indicated areas of dry land and water. This differentiation allows the hydrolygist to locate the areas of maximum water inundation, enabling him to make quick and accurate estimates of water coverage and damage. This imagery also pointed out trends of flooding in areas where flood control dykes were being breached by the swelling rivers. The success of this mission demonstrated the timeliness and adaptability of using SLAR equipped aircraft to aid in this most important facet of airborne damage assessments.

The Canadian government, using the same type of SLAR as in the OV-1D aircraft, experimented with the detection of ice in navigable waterways in 1972. NASA (National Aeronautics and Space Administration) Lewis Research Center at Cleveland, OH, also conducted ice experiments using an OV-1B aircraft on loan from the U.S. Army. Results of these investigations were encouraging. During the winter months shipping is hampered in the Great Lakes and northern waterways by large accumulations of ice which are changing constantly in size and position due to winds. Ship-

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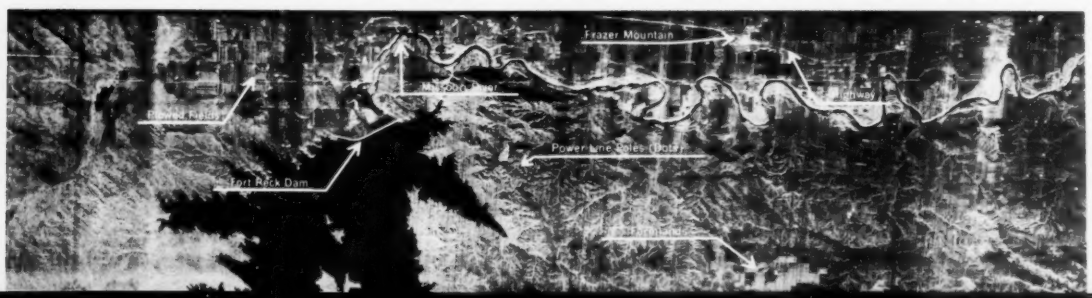
The Fort Peck Dam and Reservoir was part of a 48,000 square mile project flown by OV-1 aircraft in Montana. This strip covers the dam itself. Aside from geologic fault information obtained through interpretation by trained geologists, plowed fields, highways, soil types along the river and even power line poles can be readily identified



SLAR Image (Uncontrolled Mosaic) of Mississippi, Missouri and Illinois Rivers at flood crest. This radar image was taken over St. Louis, on 26 April 1973 at night from 13,000 ft and through 100 percent cloud cover. Flood waters appear as black areas and the land areas appear as gray tones

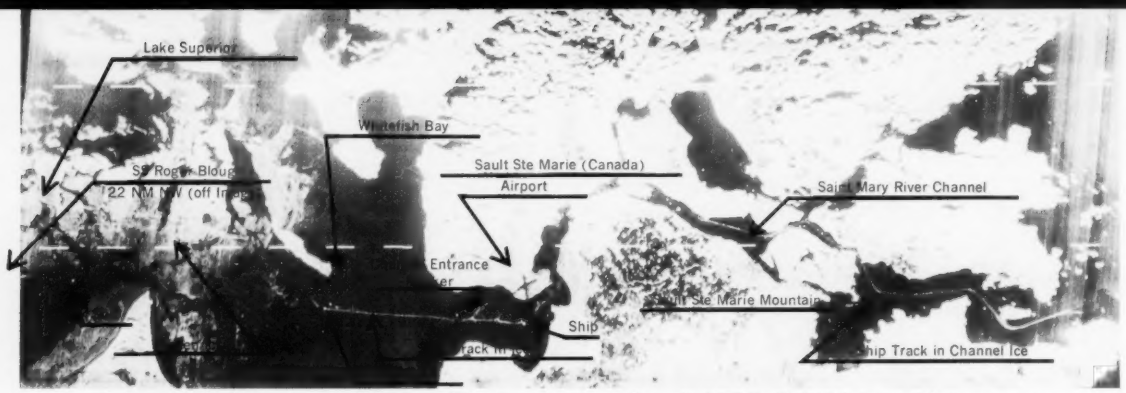
pers do not receive sufficient information on these ice conditions to allow safe passage of these waterways from December through April. Great amounts of raw materials needed in the steel and other industries must therefore be stockpiled in order for continuation of production at plants normally supplied by shipping. This stockpiling is quite expensive and necessitates a slow down in the industry during this period.

Shippers agreed to participate in the Winter Navigation Extension Program on the Great Lakes and Saint Lawrence Seaway sponsored by the Corps of Engineers, U.S. Coast Guard and NASA. It was suggested that by providing timely and accurate ice information to the shippers, the shipping season could be safely extended from the normal December to April closing period, thereby, realizing significant flow of materials during this normally closed shipping time.

The U.S. Army Electronic Proving Ground at Fort Huachuca, AZ, was asked to provide OV-1D aircraft and crews to support the extension operation. Working directly with the Corps of Engineers and NASA, daily SLAR missions were flown over the Great Lakes collecting ice data. Comparisons were made of SLAR imagery and actual ice conditions determined by visual and photographic sightings. SLAR returns were then classified as to probable type and thickness of ice.

Weather conditions were severe. Temperatures ranged to -30 degrees F. The Mohawk performed well

This is an example of information sent out to shippers on the Great Lakes. The interpretation of ice condition was made from the radar imagery by NASA. The imagery was made by one pass of an Army OV-1D at 9,000 feet and is 185 NM long. Notice the ship tracks through the ice going into the harbor at Escanaba (left hand corner of image)



Imagery received on the SS Roger Blough, an ore carrier on which a SLAR data link was installed. The ship was located about 22 NM northwest of White Fish Point; good imagery was received by the ship as the aircraft passed Detour Passage over 100 NM from the ship

in these adverse conditions. Icing and minimum ceilings were an ever-present problem. During a period of more than 90 days no significant maintenance problems were incurred on the OV-1 aircraft or systems.

The radar imagery was given to a NASA ice interpretation team as soon as the aircraft landed. The interpreters annotated the imagery and then transmitted it to concerned agencies as well as to ships on the Lakes by facsimile and radiotelephone. The ship captains could then look at the information and make decisions on courses to follow through the ice.

Time lag between the flight of the mission, interpretation and annotation, and transmission to the shippers became a significant problem. It was decided to attempt to get the SLAR information directly from the aircraft to the ships during the flight. OV-1B aircraft have the capability of data linking the SLAR imagery to a ground station; however, the new OV-1D did not have this capability.

Experiments were conducted at Fort Huachuca using an OV-1B data link system in the new OV-1D. These proved successful with some minor modification to the old equipment. Within 30 days a ground station was on its way to the Great Lakes to be installed aboard an ore carrier and a Coast Guard ice breaker for trials. The operation was a complete success. Now OV-1B and OV-1D aircraft could transmit SLAR information to the ground station on the ships giving the captains a near realtime presentation of ice conditions along this track.

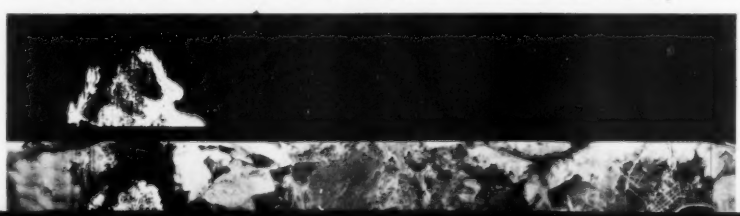
The success of the SLAR operation during the Navigation Extension Program demonstrated again the tremendous flexibility of the OV-1D surveillance system. The consistant day-to-day target coverage under adverse conditions, and the quality and timeliness of the SLAR data, provided the Corps of Engineers with a data base for determining future operations to aid winter navigation.

The SLAR provides a wide field of view to the investigator so that he may narrow down his area of interest and then apply several of the other sensors available in the Mohawk to complement his study. The IR and camera systems have been used to obtain more refined data in these specified areas, as well as in studies involving:

- Powerplant coolant discharges into rivers and bays
- Dam and reservoir seepage
- Turbidity and pollution of waterways
- Location of underground materials, i.e., buried pipes, trenches, archeological ruins
- Crop and vegetation diseases
- Location of geo-thermal power sites
- Agricultural drainage patterns
- Concentrated "hot spot" areas of forest fires

A demonstration project was undertaken in northwest Texas to determine the location of salt springs which were causing the saline content of several rivers to be above acceptable levels. Flying a combination of different altitudes and times of night, the OV-1 aircraft pinpointed a number of these springs. The IR system clearly depicted the springs because of a small temperature difference between the spring waters and the river. This project enabled the Corps of Engineers to quickly locate springs over a large area, a job which previously took many days of ground searching and physical sampling of river water.

Infrared line scanning has many uses. This strip of imagery was flown by OV-1 aircraft of the Oregon National Guard in support of a forest fire reconnaissance in their state. The top strip on the image indicates only extremely hot targets, and the bottom strip is an infrared map of the earth's surface. The hot target information locates the center of the fires and can indicate their intensity



General land usage studies have been conducted in many areas of the country. Aerial photography provides an excellent tool in detailed analysis of urban and agricultural development. The photo was taken during an investigation of industrial utilization in Arizona, and is a portion of a copper smelting operation

An entire photo study of Fort Carson was made to aid in determining land usage, and impact on the environment by military operations. Notice the number of crossing vehicular tracks in lower left corner of the photo. This study has proven successful and will aid in future data collection operations in this area

Although aerial photography is an old established tool, many new developments have come along which have greatly enhanced the capabilities of the operation. These new developments have mainly been in the area of films and processing. Improved films help to define more precise data within the area of study. By using special color and black and white films and filtering, narrow portions of the spectrum can be enhanced and unwanted information can be attenuated.

Investigations have been completed that prove the worth of this new photography technique in water quality, vegetation and erosion studies. Use of color infrared film is an excellent tool for military camouflage detection, as well as surface vegetation studies. One of the largest air photo projects ever undertaken by OV-1 aircraft was the photographing of 4,000 miles of the shorelines of the Great Lakes. A special color film was used to study shore erosion. This film, with a special filter on the OV-1D reconnaissance camera, gave an excellent view of the shore area, as well as penetrating the surface of the water showing subtle details of the lake bottom near the shoreline. Aerial photography has been used to complement studies by SLAR and IR and has given excellent comparative data.

Use of the Mohawk in these new areas of civil works applications has demonstrated the benefits of aerial remote sensing for engineering as well as ecological studies. Although a great amount of data is being obtained by satellite programs, it has been determined that it is still necessary to investigate relatively small areas of interest with systems carried by aircraft. Satellite remote sensing data covers broad areas of interest at relatively small scales. Acquisition generally depends on weather and track of the satellite. Airborne remote sensing is more flexible and can be used to supplement this data in a much more detailed scale covering smaller areas.

During the past three years the OV-1 has participated in many varied programs of remote sensing. These programs have taxed the aircraft, systems and crews to maximum capabilities. This has demonstrated the great flexibility and reliability of this equipment, as well as the ingenuity and professionalism of Army aviation. Success achieved in utilizing military reconnaissance techniques and equipment to help solve investigative problems in the civil works field has proven an exciting and satisfying challenge to all who have participated.

Lessons learned from participating in such a wide variety of unique and complex remote sensing operations will help in expanding and improving capabilities in the military environment.

Suggestions for improvements to aircraft and equipment have been a direct result of completing many hours of operations in the accomplishment of the civil works projects.

The challenge of the future is here and is being met by the OV-1 Mohawk and crews. We can all be proud of the accomplishments of this small segment of Army aviation.

CPT Richard P. Wolfe, a Signal Corps officer, is dual rated in the OV-1 and UH-1. His interest lies in airborne reconnaissance and he has been associated with the OV-1 for five years

Continued from page 3

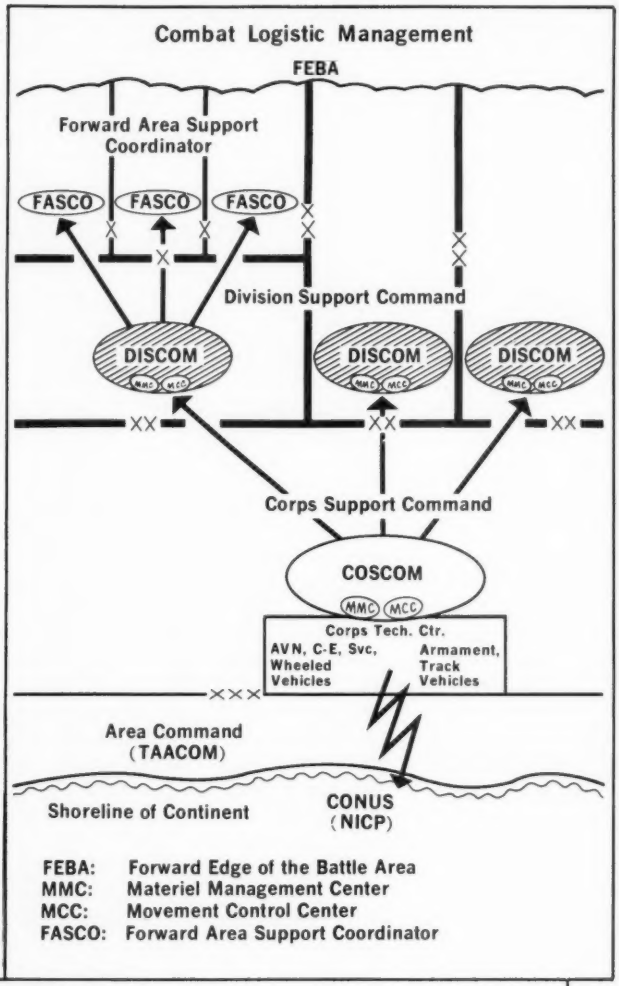
nized the three-level structure by revising maintenance allocation charts.

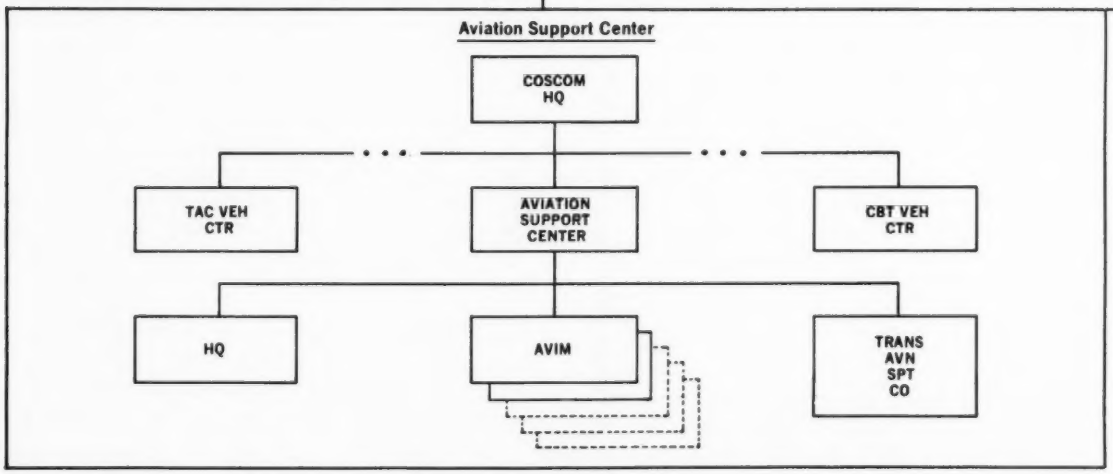
The figures on pages 20 and 21 present the aviation support center as it might appear in a normal wartime configuration. It consists of a headquarters element, two to five aviation intermediate maintenance companies (AVIMs) and a transportation aviation support company (TAS). The aviation center is not necessarily located all at one place. The center headquarters, one AVIM company and the aviation support company will most probably be located together at or near a major airfield capable of receiving and discharging C-141 and C-5A aircraft.

The aviation center structure is viable in both peace and war, and can be varied from company size to group size by addition or deletion of units and cellular teams. The center provides to frontline aviation elements:

- the capability to handle overflow requirements
- the corps backup of repair parts
- a collection and cannibilization capability
- the highest degree of technical expertise for the aviation equipment in the corps; this talent is made available to all combat commanders
- the natural technical channel to AVSCOM

Get It There! Quick and efficient transportation response is mandatory to make the logistic system work. Food, fuel, ammunition and major end items constitute the major resupply tonnages required to support a force in a combat theater. These will be moved largely by surface means as in the past. Airlift, however, will remain as the expedited means for moving high priority and emergency items, whether they be repair parts or an entire main battle tank. New dimensions in transportation will speed

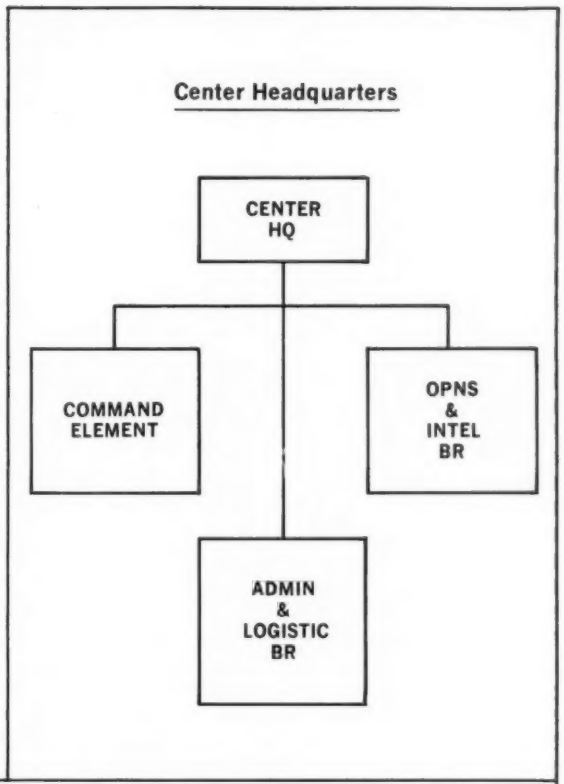


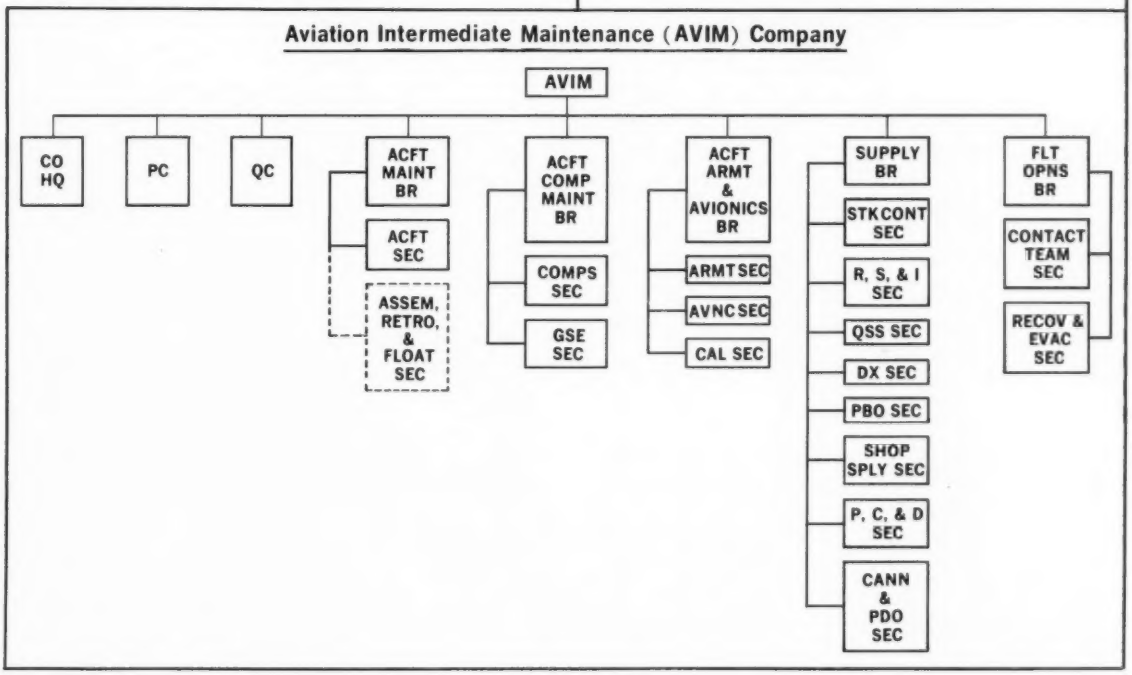


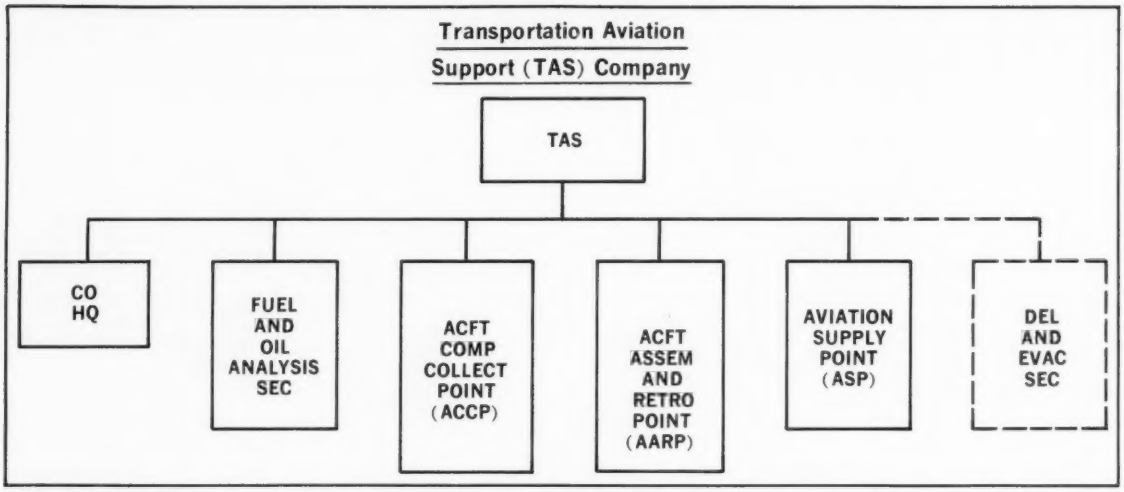
resupply within the theater of operations. Air Cushion Vehicles (ACV) are being developed to rush supplies from ships off-shore to shore-side depots or even directly to divisions at 50 miles per hour or more. New heavy vehicle transporters and container carriers will vastly augment tonnages handled by road, while helicopters move even 155 mm howitzers direct to their firing positions.

The support system to achieve the basic concepts of **Arming It, Fueling It, Fixing It** and **Getting It There** is characterized by:

- *Reduced management echelons.* Only division and corps support commands will be involved with combat logistic management. Standard automatic data processing systems are used as management tools for supply, maintenance, ammunition and transportation actions. The corps is a logistical entity, sending requisitions directly to the CONUS wholesale base. In a multicorps area, the theater Army headquarters will manage a few critical supply items and intercorps transactions only, and a Theater Army Area Command (TAACOM) may direct port/beach operations and thru-put to corps.
- *Minimum supply levels.* In an overseas area, there will be no more than 30 days of supply on the ground with 2 to 3 days in the combat brigades, 3 to 5 days in the division and the balance of 22 to 25 days in the corps.
- *Airlift of critical supplies.* This primarily involves the repair parts previously mentioned.







• *Surface lift will be containerized.* The containers will be moved as far forward as possible in the combat area before being emptied and recycled. Everyone can expect to see these "big packages" and efforts are underway to assure that we have the capability to handle them.

• *Resupply will be based solely on combat needs.* The support system will be lean and mean. It will not accept unessential supplies. Mountains of supplies which are not required to sustain the combat force will literally choke the system.

• *Movement of maintenance support forward.* Materiel that has been damaged will not flow to the rear if it can be fixed forward.

The new support system modifies the communication zone support and eliminates the field Army support we have known in the past. The commander, knowing he must fight lean, knows also that conservation and success in battle are mutually supporting . . . materiel saved today can be available for battle tomorrow when and where it is needed. Key factors in such conservation include: setting and adhering to priorities; realistic replacement and expenditure rates; full use of local resources and organized cannibilization; security for stocks and lines of communication; sound materiel management at all levels and the willingness to accept prudent risks. In order to provide maximum resources to the combat elements—the tanks, artillery and attack helicopters—we must have a support system as efficient as humanly possible. We must seek the most effective total force in the combat theater.

Details, to be described in field manuals and TOEs (tables of organization and equipment), plus equipment required to implement the evolving logistic system just described, are being written in appropriate documents this year. Full implementation Army-wide with all the required functional guidance and equipment must be accomplished as quickly as possible!

Major General Erwin M. Graham Jr. has commanded the Logistics Center since its establishment on 1 March 1973. He entered the Army through the Reserve Officers Training Corps at Mississippi State

New Aircraft Loader

A newly-developed MJ-15D aircraft loader vehicle is being tested at the Yuma Proving Ground, AZ. The low silhouette vehicle is used in much the same manner as an industrial forklift and allows operators to work under wings and rotor blades.

STANDARDIZATION CORNER

ANNUAL WRIT '75 is over! (We'll pause while you exam givers and takers shout, *"Hallelujah!"*)

Each year the Army Aviation Annual Written Examination results are analyzed to identify weak areas and possible ways to improve the next year's exam. We'd like to use this month's Corner to share some of those findings with you. Some of you may be interested in knowing how you compare with the other 22,000 or so aviators who took the exam. Perhaps some of the information will be helpful to you commanders and instructor pilots in developing your refresher training programs.

We'll confine our comments to the "high-miss" areas of the exam, i.e., those questions which were answered incorrectly by 25 percent or more of the aviators. The problem posed by each question will be presented, followed by the reasons (common errors) for the high-miss rate.

Ninety-five percent of you passed the exam on the first attempt. Considering only first attempts, the average score was 88 percent. These figures reflect the high standards of performance with which you approach your profession.

The following problem areas are the ones that gave the most trouble.

Problem: Determine the minimum weather condition that could be forecast and still allow you to request IFR (instrument flight rules) clearance.

Common Errors:

- Failure to use the lowest appropriate published minimums, e.g., PAR (precision approach radar) minimum as published in the IFR Supplement (para 4-23a, AR 95-1 and IFR Supplement).
- Failure to reduce the visibility requirement for helicopter operations (para 4-26d, AR 95-1).

Problem: Determine if an alternate airfield must be designated when filing IFR.

Common Error: Failure to reduce the visibility requirement for helicopter operations (para 4-26d, AR 95-1).

Problem: Determine if a particular airfield can be designated as an alternate airfield on an IFR flight.

Common Errors:

- Failure to reduce visibility requirement for helicopter operations (para 4-26d, AR 95-1).
- Failure to apply "other than U. S. Army/Federal Aviation Administration (FAA) procedures" criteria (para 4-24c (2) thru (4), AR 95-1).
- Failure to apply nonstandard alternate minimums when applicable (para 4-24c (1), AR 95-1, and appropriate FLIP (Flight Information Publication) Instrument Approach Procedures Booklet).

Problem: Determine the amount of fuel required for an IFR flight.

Common Error: Failure to add 45-minute fuel reserve for IFR flight (para 4-2, AR 95-1).

Problem: Determine minimum weather conditions which permit a straight-in approach.

Common Error: Failure to apply "visibility only" criteria pertaining to straight-in approaches (para 4-26f (1), AR 95-1).

Problem: Determine aircraft position relative to a VOR (very high frequency omnidirectional range) intersection.

Common Error: Misinterpretation of the VOR Course Indicator.

Problem: Determine heading required to fly a given course described by map coordinates.

Common Errors:

- Failure to apply magnetic variation.
- Applying variation and/or wind drift correction in the wrong direction.

Problem: Determine the weather broadcast schedule over a selected NAVAID (navigational aid).

Common Error: Failure to note that "H" facilities broadcast continuously (meteorological data, FLIP, or para 16-13c, TM 1-300).

Problem: Determine V_{ne} [maximum permissible airspeed – indicated] from aircraft performance charts.

Common Error: Reference to *true* airspeed instead of *indicated* airspeed.

Problem: From aircraft performance charts, determine the indicated airspeed for maximum range, and calibrated torque required for that airspeed.

Common Errors:

- Reference to wrong pitot tube position table, i.e., nose-mounted versus roof-mounted.
- Reference to *true* airspeed instead of *indicated* airspeed.
- Reference to maximum endurance airspeed instead of maximum range airspeed.

Problem: Determine the proper procedure when arriving early at destination with two-way radio communications failure.

Common Error: Misunderstanding of lost commo altitude procedures, i.e., holding at procedure turn altitude instead of last assigned until ETA (estimated time of arrival) (FLIP IFR Supplement, Two-way Radio Failure Procedures).

* * * * *

That's how the Annual Writ '75 looks in retrospect and work is already underway on the 1976 exam. Now is a good time to get your comments and suggestions in to us on how we can improve it. Send them to: Commander, U. S. Army Aviation Center, ATTN: ATZQ-S-P, Fort Rucker, AL 36362.

AIRCRAFT ACCIDENTS are usually caused by a mistake or a combination of mistakes. People—design engineers, maintenance specialists, aircrews, or supervisors—make mistakes. Accident prevention is essentially a matter of eliminating these mistakes and guarding against other errors.

The reason for an accident investigation is accident prevention—not to place blame. Accident causes are identified in order to prevent the same mistake from happening again.

Accident investigations are totally dependent on accurate information. Information comes from physical evidence and statements of witnesses. Often, there are gaps in available data. Data can also lead investigators astray. Not much can be done about physical evidence—it is either there or it is not. Fortunately, trained specialists can get a lot of information from a very few pieces. Occasionally, this is enough. Usually gaps have to be filled in by witnesses—people.

This brings me to the point that I want to stress again—the need for *timely, accurate* and *complete* reporting by people with knowledge of any information that may have anything to do with an accident.

Let me cite a recent example. After an aircraft accident investigation board concluded and submitted its report, rumors about self-medication on the part of an involved crewmember prompted the unit commander to conduct additional inquiries. Finding that the rumor did have some basis in fact, the accident board was reconvened. While the new facts did not change the accident cause factors, the board was able to dispel rumors and conjecture as to possible causes of the accident. In this instance, if people had come forward and volunteered the information at the beginning of the investigation, valuable time and manpower could have been saved. *For some reason,* they did not come forward initially and the pertinent facts were not learned until the board reconvened.

What we need to get at is the *"for some reason."* Apprehension, fear of reprisal, fear of incrimination? To allay such fears, I emphasize one important facet of aircraft accident investigation—the area of "privileged information." In order to ensure that people can provide truthful, accurate information to aircraft accident investigation boards, all information

from TAC ATTACK

General Robert J. Dixon
Commander, Tactical Air Command

collected by the boards is treated—*by regulations*—as privileged.

Information so provided cannot be used as evidence for determining misconduct, disciplinary action or pecuniary liability. It cannot be used in a Flying Evaluation Board. Another indication of the importance of total candor is the fact that witnesses before an accident board do not testify under oath. No one should evaluate the significance of a particular piece of evidence to an accident investigation and decide to withhold it. Evaluation is the board's job. The board needs all the help we can give. Every bit of information contributes and the board needs all that is available. Fitting the pieces together is their business.

It is true that we can conduct *separate* investigations if facts indicate there may be cause for administrative or disciplinary action. However, witness statements provided to an aircraft accident board *cannot* be used to *determine* these actions. Even so, there are some basic realities to face. The first is that we *have* to know what happened to protect ourselves and others from recurrence. We are professionals and we must treat accidents as professional—not fraternity—work. If people volunteer the truth to an accident board and there is concurrent or subsequent, separate reason to consider administrative or disciplinary action as a result of the admission, TAC is oriented *in favor* of the man who admitted his *mistake*—we can trust a man who made an honest mistake and admits it—he is, in fact, proven human *and* proven professional. He is *one of us*. An undisclosed mistake or willful violation is *an action against* our profession—against our effort to save lives and preserve resources. TAC's resulting orientation is very different.

Back to my point—we need timely, accurate, and totally truthful reporting—to withhold information or disguise facts could lead an accident board to reach erroneous conclusions. Inadequate corrective action based on misinformation could result in more—and perhaps avoidable—accidents. Do not wait to be called for information. Volunteer it—and tell it all—the way it is. This includes your knowledge of an individual's personal traits or faults—even if he is your fellow airman. Remember—you could save his life—that of another—an airplane—or your own life.

A Huey with "pantyhose" (salvaged parachute) makes familiar shiny parts and shapes harder to recognize

Continued from page 5

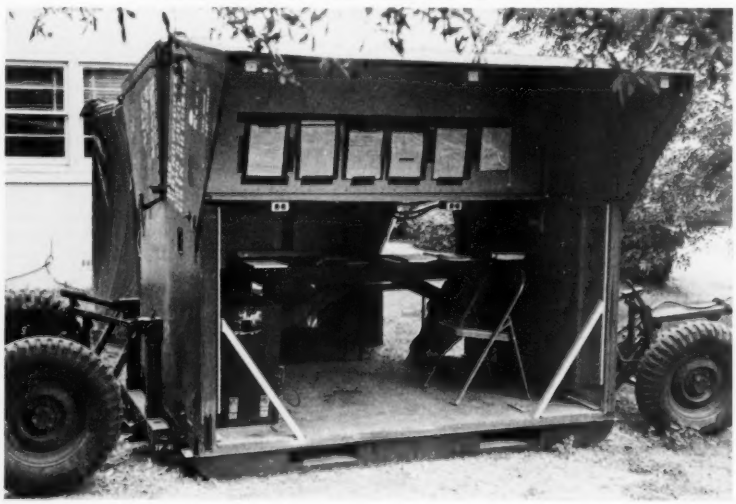
Each night's mission was required to have a ground tactical plan, a landing plan, a flight route plan and a loading plan. Pathfinders were used to provide terminal guidance alternately 5 to 8 kilometers short of the landing zone (LZ) and on the LZ. Attack helicopters were added to the mission to further tax the flight leaders with premission fire planning, the control of additional aircraft and the direction of fires while in flight.

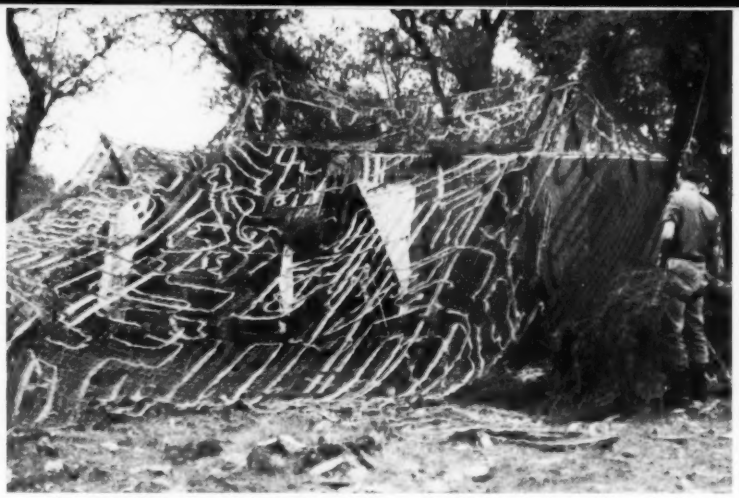
The aerial field artillery attacked preplanned concentrations and was prepared to perform immediate fire missions on targets near or adjacent to previously selected concentrations. Normally the night training flight flew a number of circuits around a single route perfecting its formation techniques, timing and landing techniques. Occasionally observers were placed at danger areas along the route to record the number of seconds that the aircraft could be heard, seen over the skyline and seen against the terrain.

The heavy left and right formations offered the most flexibility. The pilots flew as close to the ground as visibility permitted. . . this was usually from skids on the treetops to about 200 feet. Adequate visual contact with the ground was difficult to maintain at altitudes above 200 feet. By flying roughly the same time each night the aviators were able to experience various levels of moonlight. Occasionally they flew routes through the light of flares that happened to be illuminating targets in a nearby impact area. All these training missions ended with a debriefing and a suggestion period. As a result of these give and take discussions, many innovative ideas were recognized and evaluated.

Raid Planning: After his mission analysis the flight platoon leader arranged his tasks in a reverse sequence order and consulted the moon schedule. He then joined the ground commander to assist in developing the most important facet of the mission: the ground tactical plan. They used familiar ranger patrol planning techniques as an easily understood vehicle for developing the raid plan. The characteristics of routes, danger areas, actions at the objective and passing of friendly lines are similar. Of these, actions at danger areas along the flight route were given special attention. An estimate was made to determine courses of action for each unavoidable danger area that would shift the oppor-

The maintenance shelter operations center. The canvas has been removed from the side





A camouflaged maintenance shelter operations center with wheels

tunities of success into their favor. Full advantage had to be taken of the capabilities of the aircraft and of the available fire support. Should the flight sneak down a gully one aircraft at a time, or should the entire flight dash by at full speed slightly above the treetops?

Rehearsals were planned on the basis of a map study while waiting for Army and Air Force aerial photos. Maximum advantage was to be taken of the moonlight in order to fly lower and to navigate better. Since the objective was near the edge of the UH-1H Huey's fuel range, the air mission commander elected to refuel from a CH-47 Chinook in a tactical laager area in enemy territory. The rehearsals of the troop pickup, passage of lines, actions in the objective area and tactical laager area operations, solidified the procedures that would facilitate conducting the raid with radio listening silence. Only unanticipated deviations from the plan and calls for fire were expected to require radio transmissions. Preplanned inflight orders were signals.

Field Operations: The raid was launched from a mid-intensity war scenario aviation battalion field training exercise in support of an air assault infantry battalion. The company laager area was located out of the range of enemy divisional artillery. This distance, 27 kilometers, is based on the range of its 130 mm gun. Our direct support maintenance was simulated to be 50 miles farther to the rear. Preferably the company laager area was sheltered from direct visual and electronic observation by the enemy.

In the 3-square kilometer area assigned, the company was responsible for its own local security and air defense. Infantry and air defense units usually will have higher priority tasks than supporting an aviation company.

Dispersion, camouflage, discipline and a unit fire plan were used to develop a passive air defense. The operations section and the other support activities were hidden from sight between the flight platoons. Their antennas were remoted at least a kilometer to provide protection from enemy artillery. The enemy as a standard procedure uses radio direction finding equipment to find transmitter locations for artillery targets.

Telephone communications were used as a primary means of passing messages to the flight platoons and battalion. Messengers were used as an alternate communication means. Company aircraft quickly laid the wire between the dispersed command posts. A portable maintenance shelter was used as a ground mobile and air transportable operations center. It permitted careful planning during the hours of darkness and inclement weather. This system with its remoted radio package can be moved by a UH-1H helicopter along an axis of attack not supported by a road line of communication.

The aircraft were placed in hover holes (small area which requires hover out of ground effect for

The communications sergeant is securing the radio capsule that can be used in the center or remoted several kilometers to the displaced TOC's electronic signature

Displacement of the 2,300-pound operations center. Watch that downwind takeoff on a hot day

landing) at least 150 meters apart along the valleys. Aircraft returning at night were parked in open areas until they could be moved to their dispersed positions at first light. In this spread out situation, sound, light and wire signals were used to pass information concerning meetings, enemy activity and scrambles.

Carefully marked paths were used to assist in finding the aircraft in the dark. Usually two men of a crew of four were left with each aircraft to perform maintenance and to provide security. When the threat of enemy ground attack is high, the possibility of losing all the peas in the pod to an air strike must be weighed before the aircraft are grouped closer together for better local security. During periods of low activity one man should be alert at each aircraft. As the threat increases, this alert can be raised to 50 and 100 percent. Procedures for reinforcing one portion of the company laager with half the personnel from another area must be rehearsed with day and night walkthroughs. The effects of 100 percent alerts on crew rest should be carefully weighed.

Passive Air Defense: Aircraft camouflaging efforts should be keyed to the enemy's intelligence gathering means. Breaking up the aircraft's characteristic outline and disguising its operational status are effective against high altitude photography. This can be done by covering the glass, by not aligning the blade with the aircraft's axis and by placing an irregular cover over the geometric shape of the tailboom. An extra touch of placing a tree next to the fuselage will further break up the outline.

Against a low level threat such as a drone the aircraft must be hidden from view. This can be accomplished by towing the aircraft into a treeline and heavily embellishing camouflage nets with an appropriate mixture of local foliage. A motivated unit can quickly ready its hidden aircraft for flight. In all cases the distinctive unit marking, white blade tips and bright safety markings, should be painted over. If possible the aircraft should be painted with a nonreflective paint in appropriate camouflage patterns.

The discipline aspects of a passive air defense require the whole unit to pull together in creating the desired appearance. Carelessly placed vehicle tracks or paths made by lazy individuals crossing open areas can draw attention to an otherwise well camouflaged area. Perhaps the most common example of poor discipline is the parking of an uncamouflaged aircraft adjacent to a carefully concealed command post. In this situation a dropoff pad should be employed several kilometers away. When employing the many camouflaging techniques it is essential to remember that the same tricks will not fool an intelligent enemy all of the time.

Rigid passive air defense procedures should be employed in order not to attract the attention of enemy aircraft in the area. When discovered, the unit should act on centrally issued commands to return fire. Unfortunately, the many machineguns of an aviation unit have little potential of downing an enemy aircraft. Their many tracers, however, may upset the composure of the enemy pilots during their attacks.

For a higher potential of driving

The new operations center is in

A pathfinder directed pickup of the 1,200-pound TOC wheels

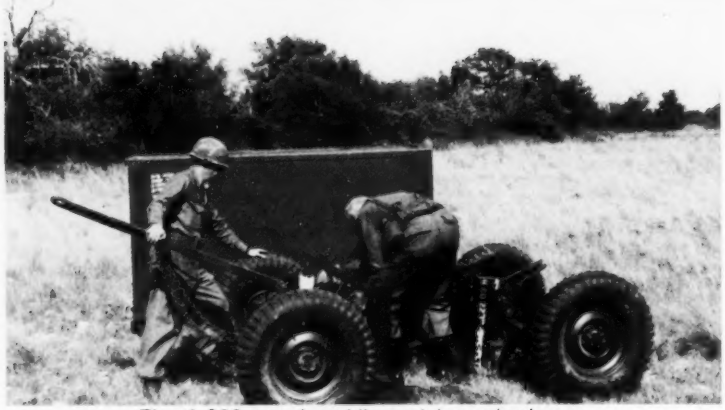
an enemy air strike away, Redeye should be employed as a golf bag weapon by the company operations personnel. These individuals who are available on a 24-hour basis can learn to effectively fire Redeye from reading the instructions and considerable dry firing. By monitoring a target alert data display set (TADDS) box linked to a nearby forward area alerting radar (FAAR), they can move quickly to their firing positions when the TADDS sounds a warning. These gunners should fire only in defense of the company on the order of an officer. Extensive training in aircraft identification is not required for this variety of Redeye gunner.

The Raid: After all the fuel tanks were topped off by hot refueling at a nearby forward area refueling point, the flight formed at the company laager area. It was essential that the troop pickup go as scheduled so that the exact passage of lines time could be met. For the ease of loading, the infantry requested a trail formation for pickup. They marked the lead chalk with a strobe light and the others with flashlights. In this manner each aircraft was able to move to its load. The mission support aircraft landed to prevent unnecessary aircraft circling around the pickup zone. By flying routes that were concealed as much as possible from enemy visual and electronic observation, the flight hoped to cross the forward edge of the battle area (FEBA) undetected under the racket of combined arms deception effort. A vees-of-three formation was chosen to aid control during the long flight to the objective. In low level flight each aircraft should be given a specific formation position to fly in order to avoid confusion. The CH-47 helicopter led the last vee with the AH-1 HueyCobras on the flanks. From those positions the Cobras could engage unexpected air defense weapons long enough to permit the flight to pass by. At known danger areas the AH-1 helicopters would be sent ahead to suppress enemy positions. The routes to and from the objective had been selected after many hours of map and intelligence information study. They avoided the enemy positions and native habitation as much as possible.

Time-distance and dead reckoning techniques were used as the primary navigation means. Secondary advantage was taken of friendly and enemy navigation aids. A release point was designated at a prominent bend in the railroad track adjacent to a highway linking two towns. Pathfinders marked the terminal guidance point 7 kilometers short of the objective. They guided the flight with a light gun and a 10-pound automatic direction finder (ADF) beacon. A frequency modulated (FM) radio was carried as a backup homing capability. The pathfinders had moved 12 kilometers overland from their parachute drop zone to reconnoiter the tactical laager area and to operate the terminal guidance point.

Actions in the Objective Area: Actions in the objective area began at the release point. There the flight leader signaled the flight with his rotating beacon to move into the heavy left assault formation. That formation was chosen because it conformed to the ground tactical plan and the open terrain near the objective. The attack aircraft sped ahead at the terminal guidance point to begin their preplanned fire missions 30 seconds ahead of the troop landing. Their

The 1,100-pound maintenance shelter tactical operations center is moved without wheels to a new location



The 1,200-pound mobile container wheels are being readied for the manpower pull of the maintenance shelter operations center into the woods

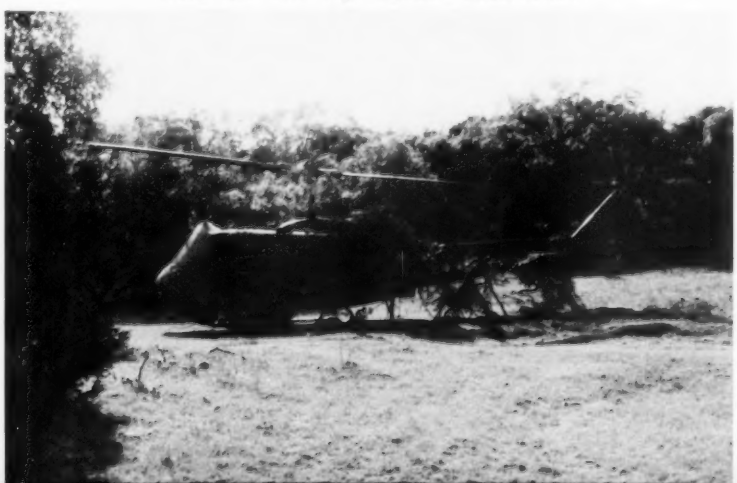
targets included a reserve tank company parked fender-to-fender 3 kilometers away and suspected air defense sites near the objective. The pilots expected to neutralize the tanks by shooting 40 mm dual purpose ammunition and 2.75 inch high explosive antitank (HEAT) rockets at their lightly protected engine compartments while pinning the crews down in their sleeping quarters with fleschette rockets. Air Force aircraft could have been used more effectively against the tanks. Concurrently, the troop aircraft flew below the lip of a ridge, through a saddle and along a dirt road to the objective. There the infantry dismounted the aircraft in their assault formation. A single helicopter was dropped from the formation to place a security element at its position 600 meters away from the objective.

Enroute to the tactical laager area the lead aircraft was declared shot down. The second in command immediately sent the spare ship in to pick up the crew. This backup aircraft accompanied the raid in order to provide a means of carrying the friendly personnel from downed aircraft and captured materiel to friendly lines. All the crew members and Soldiers on the operation were prepared to evade to friendly territory. Chances of rescue in a high threat environment are expected to be limited. Aircraft shot down close to the ground probably will land within range of the enemy's highly effective antiaircraft weapons.

Tactical Laager Area: The tactical laager area in the enemy's rear area was used for security and for fuel conservation purposes. Nonessential circling and crossings of the FEBA were expected to unnecessarily hazard the aircraft and give away the location of the raid. On this raid the attack helicopters accomplished their preplanned fire missions and then waited on the ground in the laager area for immediate calls for fire. The assault helicopters flew low level to the laager area to refuel and to wait for extraction of the infantry. The CH-47 had departed the flight at the terminal guidance point to prepare for refueling the flight.

Hours before, the pathfinders had verified the pre-mission map and photo security analysis of the laager area. They then emplaced a colored lighting system to mark recommended aircraft parking positions for the refueling operation and subsequent wait. To enhance security the flight leader shut down the aircraft engines after all the craft had refueled. In the dispersed aircraft park crewchiefs with machineguns were sent out to perform listening post duty. Light and whistle signals were used for alert, assembly and takeoff communications. About two minutes were required to prepare the CH-47 for refueling operations. The fuel was carried internally in two 500-gallon blivets. It was pumped from the back of the aircraft by a forward area refueling equipment (FARE) system pump and filter unit and sent to two hot refueling points at a rate of 50 gallons per minute. Twelve minutes were required to refuel all the mission aircraft including the Cobras. The 1,000-gallon internal fuel load of the CH-47 would have permitted the carrying of 4,000 pounds of ammunition for the Cobras. The CH-47 pilots reported that some difficulty was experienced staying in formation when the flight slowed to below 40 knots in heavy rain.

Camouflage and a salvage parachute break up the characteristic outline and glint of a Huey from low and high altitude observation

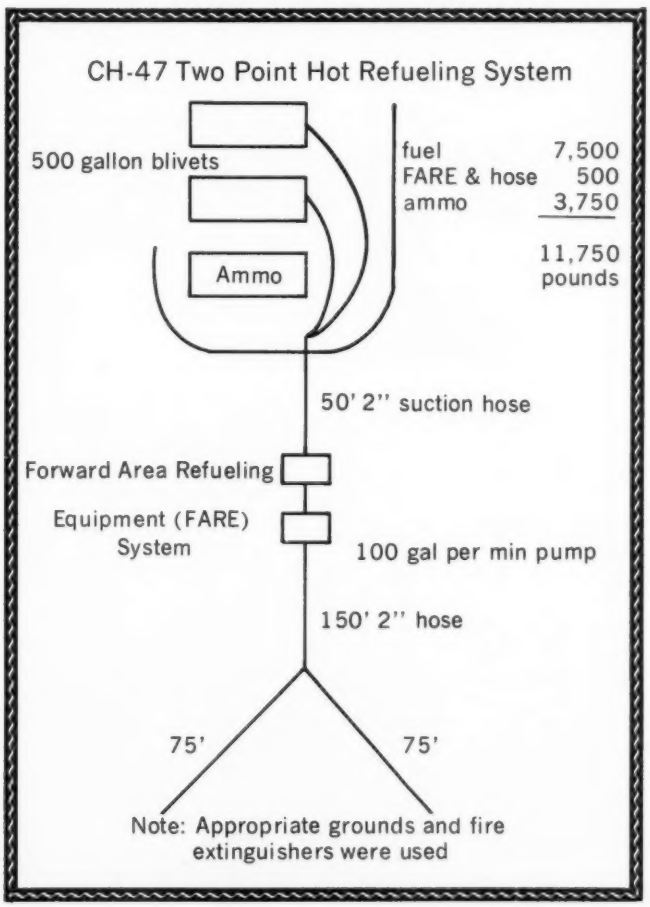


The raid progressed well. One immediate fire mission was called to destroy a vehicle that was moving toward the objective area with its headlights on and the aggressive infantrymen completed their mission early. When the aircraft were called for an early pickup a rotating beacon signal was used to direct the flight to crank its engines. As the outposted crewchiefs reached their aircraft, the aircrafts' running lights were turned on. When all the lights were on, the lead aircraft flashed its rotating beacon again and in 10 seconds the flight lifted off. Since much of the element of surprise was lost for the extraction, the flight suppressed its way into and out of the pickup zone with door gun and attack helicopter fires. The CH-47 carrying the pathfinders rendezvoused with the flight on the route back to friendly lines.

Since the return time to the FEBA could not be exactly estimated, the flight relied on preplanned procedures for the passage of lines. An appropriate code was set on mode one of the transponders in all the aircraft to identify the flight as it entered friendly lines. Care was taken to ensure that a "normal" transponder setting was used. If radio transmissions had been permitted the flight could have requested an update on the enemy situation as they returned. High frequency radios could have been used for this purpose and to send reports as far away as the objective area. FM communications were limited by their line of sight characteristic when the aircraft were flying close to the ground.

Debriefing: Once inside friendly lines the complete flight was halted out of artillery range for a debriefing of all the ground and aviation participants. This prompt rehash of the action captured most of the observed information. Postmission gatherings provide the best opportunity for surfacing mission problems and ensuring that advantage is taken of lessons learned. After the aircraft have been released to their parent organizations, further questioning is difficult to accomplish.

The completion of the raid established that the company had achieved a plateau of night terrain flying performance that was essential for readiness. By allowing the junior leaders to develop the operation and to make their own decisions, a great deal of learning was experienced by all of the participants. Many of the ideas and the techniques that were shared during the exercise will foster the flexibility that is necessary for victory in an enemy high air defense environment. To maintain and improve this raid capability, all the night flying battle captains and aviators must practice weekly. Frequent night terrain flights will build winners while providing an opportunity for highly professional fun. If units are not required to maintain a satisfactory night terrain flight capability, they will be unable on short notice to perform their missions satisfactorily. The resulting loss of men and machines can be ill afforded by the U.S. Army in a short, hard-hitting modern war.



USAAAVS

The safety department creates an atmosphere of safety consciousness never before possible in all facets of operation

Lieutenant Phillip A. Barry

Assistant Safety Officer, VT-26
from the Navy's APPROACH magazine

THE SAFETY DEPARTMENT WORKS

The concept of a safety department organization which includes the quality assurance function is still under evaluation Fleetwide with resolution of the matter expected in the near future. The Naval Air Training Command, however, has already adopted this concept. This article is a report on the experience of one training command squadron

OVER THE PAST YEAR, the safety department concept has proved successful in attaining the safety goals of our squadron. Primarily, this is evidenced by completion of a year and a half of accident-free flying while completing all training requirements. This includes over 40,000 hours and over 600 student carrier landings. There are, however, other more subtle achievements which underlie this accomplishment.

The command has been able to use the safety department as a management tool to accomplish a desired goal rather than use the safety officer as a special assistant to "stamp out brush fires" or as an ineffective one-man crusade for safety. In short, the safety department concept has permitted our squadron to make safety a "business." The following are specific areas of achievement with noteworthy advantages.

Quality Assurance/PMCF (postmaintenance check flight). Whenever the safety department concept is mentioned, the first objection, inevitably, is taking QA out of the maintenance department. The operation of QA within the safety department has functioned smoothly with no major problems. It has operated as a very effective "check and balance" system. The training programs, CDI supervision, safety UR reporting, etc., all operate as effectively, if not more so, than before. The QA personnel seem less reluctant to actively pursue a problem within the maintenance department now that they are not a part of it, at least administratively.

The most notable achievement attributable to this attitude is QA's system of monitoring and reducing repeat gripes. The PMCF officer, in conjunction with the QA division, has instituted an effective program for training and qualifying PMCF pilots, resulting in a high degree of standardization. Because this all takes place within one department, with QA acting as liaison between maintenance and safety, a much smoother, more effective evolution has resulted.

NATOPS Officer. Historically, the NATOPS officer, working for the operations officer, was tasked with evaluating the effectiveness and quality of pilot standardization and training programs. This meant that as a member of the operations department he was supposed to objectively check the effectiveness of that department, analogous to quality assurance being under the maintenance officer. With the addition of NATOPS to the safety department, the check and balance system can function more effectively. Through his monitoring and scheduling of pilots for their NATOPS/instrument checks, the NATOPS officer has proven to be beneficial when dealing with a wide diversity of backgrounds and experience levels. The commanding officer, through recommendations from the NATOPS and safety officers, can more effectively utilize personnel and assign billets based on an individual's knowledge, experience, and performance on NATOPS/instrument checks and exams. This objective information can be of great assistance to the command when assigning such key collateral duties as PMCF, membership on NATOPS and instrument boards, etc.

Ground/Industrial Safety Officer. The first improvement in this area is an active participation and interest in the Enlisted Safety Council. This brings to light some problem areas which might not otherwise surface. The second improvement is the recent implementation of a motorcycle safety course which hopefully will reduce the annual toll in lives taken by motorcycles.

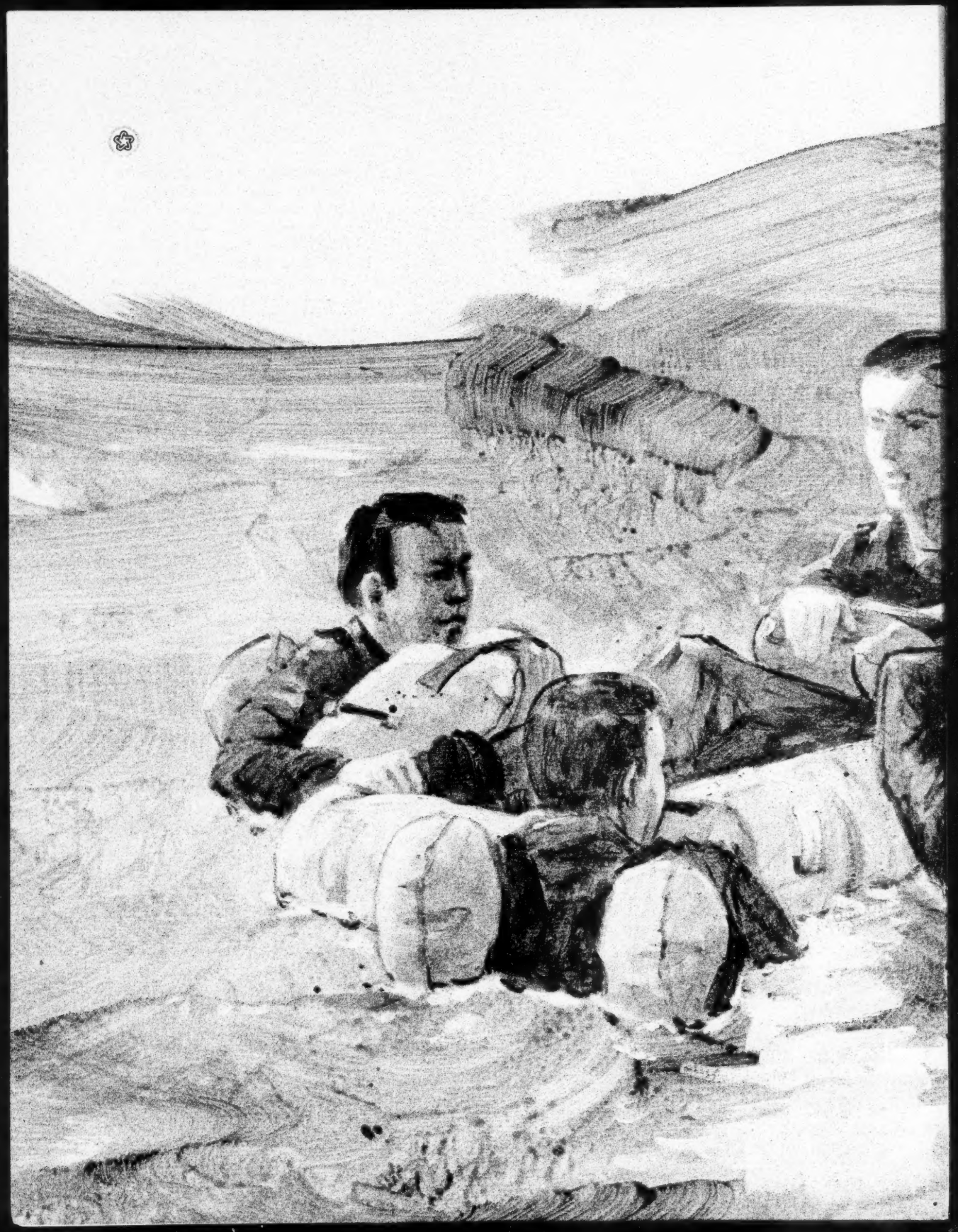
Safety Information and Education Officer. In his capacity within the safety department, he has been able to disseminate current, applicable safety information to pilots through a series of periodic lectures. Included are such items as past and present aircraft problem areas, procedural techniques related to safety, and general safety information.

Records and Reports Officer. The creation of this billet within the safety department has allowed the safety officer to pursue other managerial responsibilities. This billet performs the research and, with assistance from QA, compiles information and prepares safety UR/Incident reports which are submitted to the safety officer for final approval.

General. The advantages of the sheer numbers of personnel within the safety department are numerous. First, it gives the safety department more exposure to all facets of squadron operations, thereby creating an atmosphere of safety consciousness never before possible.

Secondly, the safety officer is no longer just one individual who is expected to cover all aspects of safety within the squadron. He is now a department head who can maintain formal as well as informal lines of communication with all other departments while delegating authority and responsibility for specific undertakings within his own department. He has become a safety program manager who can plan, organize, direct, coordinate, and control all aspects of the safety business.

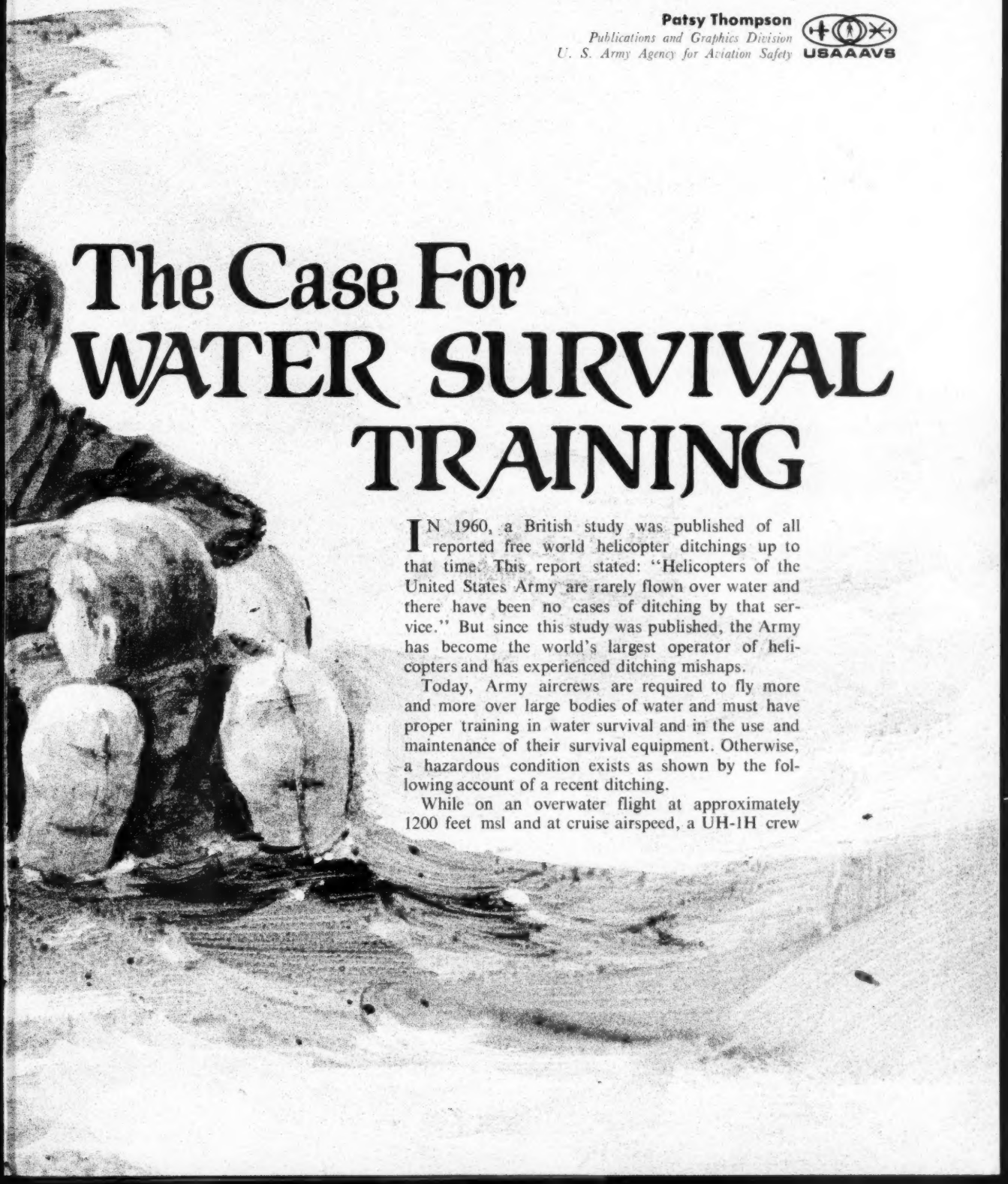
Thirdly, this concept enables more junior officers to become engaged in the safety business. This will reap significant benefits in the future as more and more officers/aircrews become aware of the operation and goals of the safety program within naval aviation.



Patsy Thompson
Publications and Graphics Division
U. S. Army Agency for Aviation Safety

USAAAVS

The Case For WATER SURVIVAL TRAINING



IN 1960, a British study was published of all reported free world helicopter ditchings up to that time. This report stated: "Helicopters of the United States Army are rarely flown over water and there have been no cases of ditching by that service." But since this study was published, the Army has become the world's largest operator of helicopters and has experienced ditching mishaps.

Today, Army aircrews are required to fly more and more over large bodies of water and must have proper training in water survival and in the use and maintenance of their survival equipment. Otherwise, a hazardous condition exists as shown by the following account of a recent ditching.

While on an overwater flight at approximately 1200 feet msl and at cruise airspeed, a UH-1H crew

of four heard a loud metallic-type bang and felt the helicopter shudder. The engine then lost power, the rpm warning light came on and the rpm indicator needles split. Attempting to reach land, the pilot made a left turn, but realized that because of distance and low altitude he could not safely reach his intended destination. He then made a right turn to ditch the helicopter between swells. The instructor pilot (IP) made a Mayday call and rebriefed the crew on ditching procedures.

When the helicopter hit the water at near zero airspeed, the pilot applied full pitch to reduce rotor rpm. Upon ditching, the helicopter rolled with the swell onto its left side. The pilot and IP exited through the pilot's door and the technical observer (TO) and crewchief exited through the right cargo door, taking with them three of the four LRU-3/P liferafts on board. The aircraft was a total loss, but none of the crewmembers were injured.

All crewmembers were wearing LPU-10/P underarm life preservers. Two of the crewmembers' life preservers failed to function properly. The right water wing on one preserver had to be inflated manually. When another crewmember pulled the strings on his preserver, the left string broke and the preserver had to be manually inflated.

Problems were also encountered with the LRU-3/P liferafts. Only two of the three rafts tossed from the aircraft when it hit the water were in reach of the crew. Of these two, one failed to inflate even after the zipper had been opened all the way. The other raft inflated to about 85 to 90 percent, but was sufficient to keep one man afloat. The other three crewmembers held onto the sides of this raft and they remained in the water which was surrounded by JP-4 fuel for 1½ hours before being picked up by a Coast Guard helicopter. They also had difficulty in climbing into the litter basket during rescue because they were not familiar with its use and had not been trained on how to enter the basket.

The problems the crew had with their survival equipment were due to both faulty equipment and a lack of detailed training in its use. One crewmember had to continually inflate his preserver manually because of a slow leak on one side. The LRU-3/P liferaft that partially inflated could not be inflated fully because the oral inflation valve would not open. This same problem was present with the raft which would not inflate at all. When the aircraft was recovered from the water, another raft was found inside. Attempts made to inflate this raft, even after the zipper was completely opened, were unsuccessful. The raft was then taken out of its canvas container and the lanyard connected to the CO bottle was pulled vigorously, causing the raft to fully inflate. However, without constant tension on the lanyard, the CO_2 bottle would stop discharging.

Two of the crewmembers had not been trained in water survival and another had not been trained in either water survival or drownproofing. The training which the crew had received failed to include a detailed explanation and demonstration on how to actuate the underarm life preserver and the liferaft. In addition, the crew was not wearing the CNU-7P backpack liferaft carriers which were available in the unit. This lack of proper training may have contributed to the crew's difficulty of inflating the water wings and liferafts and the premature decision to discard the other raft.

While the unit to which these crewmembers were assigned had appropriate published directives and SOPs pertaining to water hazards and training requirements, noncompliance with the directives indicates a lack of command emphasis and interest.

As Army aviation has developed to the point of

routine overwater flights, the need for water survival training is apparent. Since 1962, graduates of the U. S. Army Aviation Center at Ft. Rucker have received training in water survival, but this training has been limited to classroom instruction concerning liferafts and underarm life preservers, survival radios, components of the overwater survival kit to include rafts, and use of the body armor and helmet for buoyancy. This training is conducted by the Survival Training Branch for initial entry students and NCOES required to perform flight duties. A refresher course is also available for personnel attending the Rotary Wing Qualification Course. In some cases, those graduating before 1962 may not have had formal survival training unless they had the opportunity to attend an Air Force or Navy survival school. Because of this limited or lack of formal training, each unit involved in overwater operations must have and support a vigorous water survival training program which is geared to its climatic conditions.

In accordance with AR 385-15, dated 18 June 1971, commanders will ensure that persons involved in tactical water operations are given water survival training, preceded by the beginners' swim test as prescribed in chapter 17, FM 21-20, "Physical Readiness Training." They will also ensure that prior to amphibious operations, all equipment is checked for operational readiness by strict adherence to TMs 55-1500-204-25/1 and 55-8465-206-13, and that crewmembers are familiar with chapter 8, FM 21-26, "Survival, Evasion, and Escape."

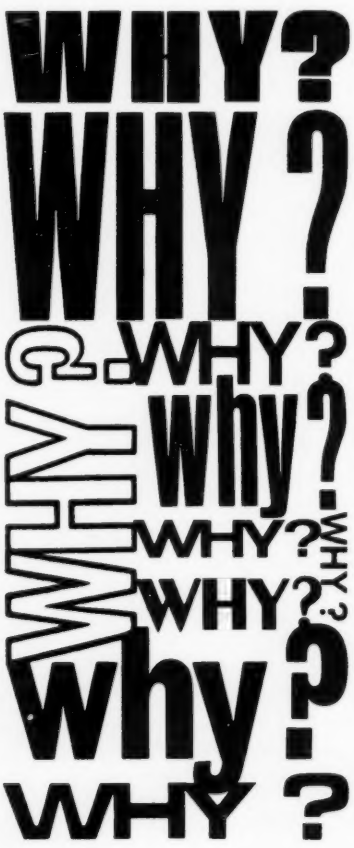
In addition to unit training, Air Force and Navy survival schools are available for Army personnel on flight status. Commissioned or warrant officer Army aviators or enlisted crewmembers can apply for an in-depth 4-day overwater survival course conducted by the U. S. Air Force Water Survival School (Course No. S-D86-A), Homestead, FL. This school is doing an excellent job of assisting Army aviation in our training. Quotas are allotted to CG, TRADOC, by the Air Force Military Personnel Center; Training, Pipeline, Management Division; Randolph AFB, TX 78148, for suballocation. TDY travel expenses are the responsibility of the unit to which the individual is assigned and each student is responsible for his special clothing and equipment required by the school.

This school provides instruction in the proper use of personnel equipment, flotation equipment and accessories in the Air Force inventory. Instruction is also given on personal health, foraging at sea, and poisonous, ferocious, edible and nonedible fish and mollusks. Included are firing of pyrotechnics, individual demonstration of prowess of canopy release while being dragged through the sea, disentanglement of suspension lines, inflation of single and multiman rafts, use of signaling equipment, vectoring the helicopter in position for rescue, radio procedures, rescue recovery techniques, medical aspects of water survival and helicopter pickup.

The Navy also has an excellent 4½-day Swim, Land and Sea Survival Course at Pensacola, FL, providing essentially the same instruction as that of the Air Force. Approximately 2 days of this course are devoted to actual training in or on the water. The school also offers a 1-day refresher training course for officers and enlisted crewmembers. Quotas are allotted to CG, TRADOC, by the Naval Aviation School Command, Director of Survival Training, Pensacola, FL 32507.

A unit's training program must include water survival knowledge and know-how to instill individual confidence and develop proficiency. Otherwise, survival at sea becomes a matter of chance rather than ability.

Colonel Samuel P. Kalagian
Directorate for Aircraft Accident Analysis and Investigation
U. S. Army Agency for Aviation Safety



A STRANGE philosophy seems to have permeated our aviation community lately, particularly when it comes to defending an aircraft accident. In almost every recorded case of a wire or tree strike mishap occuring during NOE flight training and/or tactical training exercises, reviewing and approving officials constantly allude to aviation safety as inhibiting "realistic tactical training."

In many other documents concerning current and future aviation operations, the same theme is championed—safety must take a back seat to training and aviators must be permitted to fly their aircraft just as they would in combat.

Isn't it ironic that commanders never advocate the use of live mines during land mine warfare training nor have many ever made a strong bid to permit the use of live ammunition by soldiers on both sides in a free play exercise.

Invariably, however, these same commanders clamor for the removal of any and all safety guidelines when it comes to aviation tactical training exercises so that aviators will be "exposed to those situations which they will confront in a real combat situation."

It is inconceivable that in this area where a single mistake or error or omission can produce catastrophic results and multiple fatalities, commanders would want prudent safety measures removed.

Documented records from every war beginning with World War II show that the United States military has suffered more aviation fatalities and more aircraft losses in training and in accidents than have ever been lost to enemy action. Even though we charged off many aircraft accident losses in RVN to "combat action," the record still supports the old axiom that the combat loss to accident loss ratio is invariably 40 to 60 respectively.

Today, NOE flight training is considered unique and deserving of special consideration for relaxation of safety standards. Many commanders contend that NOE route reconnaissance and hazard marking can not be accomplished in a fluid combat situation. The contention is that enemy radar and air defense will preclude such luxuries and, therefore, why should it be practiced during training? Yet, to date, no one has disputed the use of a C&C ship to direct our NOE attack helicopters into target areas! How will the C&C ships survive?

Instead of relaxing safety controls, commanders should emphasize the development of techniques and standards for NOE flight in mid- and high-intensity threat environments to ensure the conservation of their aviation resources whether it be in training or in combat. New techniques and new methods must be developed to pinpoint flight hazards in, around, over, through or beyond the battle area and these must be incorporated into our training manuals and tactical SOPs.

Losing aircraft and crews in combat because of failure to detect and then forewarn crews of existing hazards is both foolish and negligent. Our crews and aircraft are not perfect. If they were, we could dispense with training and jump immediately into combat. But both man and machine have flaws; therefore, we train to achieve perfection.

Unless we observe sensible safety standards while we strain to achieve "realism," it is all for naught. The loss of even one aircraft or one crew is more than the acceptable standard. As a commander, zero accidents is the goal —and if "safety inhibitions" are in opposition to realistic training but produce zero losses, who really wants otherwise!

SUPERVISION + SAFETY = A WINNING TEAM

CW2 Robert L. Heck Jr.
and
CW2 Ferris E. Hoover Jr.

Paper Programs Work Best For Paper Airplanes

Views expressed in this article are not necessarily those of the Department of the Army or USAAAVS. The authors show, in an exaggerated example, some problems and frustrations they experienced as aviation safety officers and suggest ways to improve the efficiency of ASOs. Reader comments and suggestions concerning this article are invited. Please address: Commander, USAAAVS, ATTN: IGAR-PG, Ft. Rucker, AL 36362

SCENE: A company-level aviation safety officer is being debriefed by a member of a command safety inspection team.

INSPECTOR: Your files and inspection records are in perfect order. You must have your own clerk for everything to be so neatly typed and filed.

ASO: No, sir. I do all my own typing and filing. I got a little advice from the company clerk on how to set things up, but I had to do all the work myself.

INSPECTOR: The entire company area was neat as a pin. I bet you don't have any trouble with FOD. We're going to give this unit an outstanding rating. By the way, how many accidents did you have last year?

ASO: We only had two accidents and five incidents during the last fiscal year and only one incident during the first quarter of this year.

INSPECTOR: What were the causes? Any trends developing?

ASO: Well, the two accidents were pilot error. Both crews had been on duty every day for a month, but the boards thought that since the pilots had only averaged about 45 hours flying time for that month, fatigue wasn't a factor. The incidents were all different kinds of maintenance errors.

INSPECTOR: Who were on the boards?

ASO: Mostly Category B aviators. This post is short of all types of aviation personnel so the commander figures he can't afford to use his operational pilots on boards.

INSPECTOR: What about the post ASO? How long has he been in the business?

ASO: Captain Wingwalker has been here for 6 months. He went straight to USC from flight school before coming here. His predecessor got caught in the RIF, but he never went to a safety school. Anyway, I think he asked for duty as a safety officer after he was involved in an accident as a passenger.

INSPECTOR: What's the post's accident record for the past year?

ASO: Seven accidents last year, counting our two.

INSPECTOR: I see.

The ASO in the above scene had managed to get all the maintenance and support personnel in the unit on detail at one time or another during the pre-

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CW2 Heck is a graduate of the USC Aviation Safety Officers Course and served as an ASO with the 101st Airborne Division and 18th Aviation Company during his second Vietnam tour. He is presently an aviation safety technician with the 571st Medical Detachment (Hel Amb), Ft. Carson, CO. **CW2 Hoover** is also a graduate of the USC Aviation Safety Officers Course. He was a safety officer with H Troop, 17th Armored Cavalry Squadron, during his second Vietnam tour, and is now assigned to the 571st Medical Detachment.

PAPER PROGRAMS

ceding 30 days and every bit of the maintenance area and flight line had been cleaned thoroughly. All maintenance publications had been brought up to date and put in new binders. Operations had retyped all the flight records and all the errors had been corrected on the DA Form 759-1's. All the unit SOPs had been redone and everyone's flight equipment had been inspected and replaced as needed. The unit was ready for inspection. Or was it?

The ASO didn't mention that of the six incidents, five were caused by nonstandard maintenance and the other by FOD. Of the maintenance personnel assigned to the unit, only the maintenance NCOIC and the technical inspector had more than 1 year's experience. The rest of the maintenance platoon was a mixture of mismatched MOSs and people sent to the unit on rehabilitative transfers. E-4's held all the supervisory positions and until the big push for the inspection all the maintenance publications were at least three changes behind. No one was allowed to remove any publications from the maintenance office so all references had to be copied in the office and the mechanic then went out to the aircraft and did the work. Unless the aircraft was hangared for maintenance it was parked about 400 yards away from the maintenance office, so a lot of shortcuts were taken during unscheduled maintenance.

Whenever the unit had any missions to fly, all the flight crews were required to come in until the end of normal duty hours, even on weekends. Night missions that lasted until after midnight were no excuse for not being at the unit the next morning at 0730. The safety officer talked to the commander about the policies and was told, "We're supposed to prepare for combat operations and I ran my unit this way in Vietnam. We're all going to have the toughness for combat and if anyone can't take it we'll assume he's not fit to fly for the Army!"

The unit got their outstanding rating and then went back to their old way of operating. The commander was happy and gave the ASO a 3-day pass as a reward. He then put him back on as pilot for a brigade commander who always wanted his aircraft parked outside his headquarters with the crew on standby in his sergeant major's office. The safety officer put in 60- to 80-hour weeks just like everyone else and had about 3 hours a week to work on the unit's accident prevention program. He managed to get his quarterly surveys done by convincing the commander he needed 2 days per quarter so the paperwork could be done and the unit could keep getting outstanding ratings on inspections.

This is an exaggerated example but we all know that some accident prevention programs may become

paperwork exercises so inspectors will be impressed with our efficiency. For a long time some units placed little or no emphasis on the effectiveness of accident prevention programs. As long as operational requirements could be used to explain away accidents there was more emphasis on appearance than effectiveness. Now in the time of budget cuts and reduced personnel, we need to find a new yardstick to measure our aviation accident prevention programs.

We think we've found one way to improve our program. Instead of the formal file of minutes of each month's safety meeting with file symbols and cutoff dates on each folder and all the references put into neatly labeled drawers which scare away potential users, it would be better to have a journal for the safety officer. This would be a continuous account of all activities pertaining to aviation safety which would be handwritten and much easier to maintain. This journal would contain summaries of all safety meetings and the results of day-to-day observations made by the safety officer. Of course the writing would have to be kept neat so others could read what was in the journal. The results of suggestions made and a record of progress on projects undertaken could be kept in the journal for easy reference and the absence of the safety officer would not prevent someone else from using the journal for reference purposes.

The journal could be kept on a yearly basis with a summary of continuing projects and goals for the new year being the first entry. These journals could be kept in the active files for a period of 3 to 5

years before being destroyed or retired and would provide a ready reference of past projects that worked and didn't work, as well as a history of the unit's performance. An outline of what would be mandatory entries could be developed and any entries made outside the guidelines would be based on the individual unit's needs.

Of course, the handwritten journal would not be as impressive as neatly kept files and it might take a few minutes longer to find an entry by topic if the date were not known specifically. The advantages in time and effort saved would be tremendous, especially for those safety officers with minimal typing skills.

Standard operating procedures for each unit should be spelled out clearly in the file that all newly assigned aviators are required to read. But whenever there is an area that is difficult to be specific about, it should be stated as such and guidelines laid down which give the aviator the flexibility to find other than obvious ways to get the job done. SOPs are required and needed but they should not be so restrictive as to prevent the use of initiative and imagination by the individuals performing the mission.

Reading files and references should be readily available to all and not filed away where they can look pretty for the occasional inspector. To be effective, references must be clearly labeled and easy to read. There are many sources of data for aviators to use and these must be available if they are going to educate the aviator in the performance of his missions.

The size of a particular unit will dictate the best type of prevention program to use, but close cooperation between the safety officer and unit commander is essential to an effective program. If either the commander or the safety officer refuses to listen to the other, the program will fall by the wayside and be overshadowed by personality conflicts. When there is daily contact among all members of a unit, the safety officer can easily keep track of individual performance and problems and give timely advice to the commander about training programs and topics to be covered in the classroom. In larger units the commander and safety officer must depend on each platoon to keep them current on problem areas and individual performance.

The way safety meetings are conducted also depends on the size of the unit. Small units can be more informal than large ones and the meetings can be conducted on a discussion basis rather than have an assigned instructor cover a topic in a formal class.

The commander and safety officer should be flexible and openminded about what will work within their unit. When the right formula for the unit is found it should be written down in the form of the unit safety SOP and made available to all members of the unit. The SOP should have provisions made for modification when conditions or mission requirements change and all members of the unit should be encouraged to assist in keeping the procedures current. The SOP should be specific as to goals to be achieved and more general as to how to reach the goals. Individual compliance with the specifics of the SOP should be demanded by all members of the unit and shortcuts should not be tolerated. Most aviation operations have many areas which are not perfectly delineated and, whenever possible, there must be a feeling of trust communicated to the people responsible for the safety of lives and equipment. Trust in the judgment of the responsible individuals will encourage them to perform at their best and generate interest in the unit's accident prevention program.

There is the possibility that a safety officer will lose his objectivity after a period of time in the same unit. Provisions should be made for periodic replacement of individuals serving in the safety officer's job. This does not necessarily mean that the individual has to be moved out of the unit but that a fresh outlook should be installed in the job. This could be done with two qualified safety officers in each unit working specified periods of time or by training other members of the unit to conduct periodic surveys. A distribution of responsibility for safety meetings can bring a great variety of viewpoints to the aviators assigned and get the entire unit interested in improving the unit's performance and the effectiveness of the accident prevention program.

The point we are trying to make is that each unit in the Army has a personality and what works for one unit in preventing the loss of lives, time and equipment through accidents may not work for another. Safety operations are difficult to maintain and without the complete interest of every member of a unit in doing things the right way, the unit's accident prevention program will not work. Pretty files and eyewash will not prevent accidents. Consciousness of the inherent dangers of the environment in which we operate and developing in each Army aviator the desire to accomplish his mission and get himself and his machine home safely so he can perform again tomorrow will ensure that progress towards the goal of a zero accident rate continues. We think if we remove the requirement for administrative excellence from the ASO, he can more easily and effectively perform his primary function of educating his commander and the other members of his unit and be many times more effective in preventing mishaps.

USAAAVS

MAINTENANCE REQUEST
For use of this form, see TM 38-750; the proponent agency is Office of the Deputy Chief of Staff for Logistics.

* See reverse of this copy for codes and additional data.

PAGE NO. 1 | NO. OF PAGES 2 | REPORTS CONTROL SYMBOL CSGLD-1047 (R1)

☐ WORK REQUEST ☐ MWO ☒ EIR ☐ ORGANIZATION ISSUE PRIORITY DESIGNATOR CODE

SECTION I

CONTROL NUMBER: 622163	1a. ORGANIZATION: USAAAVS	4. LINE NUMBER: N/A	5. MODEL: OH-58A	6. LOCATION: Fort Rucker, AL 36362	6. FEDERAL STOCK NUMBER: 0000-000-0000	6. UNIT IDEN CODE: 0000-AA		
7. SERIAL NUMBER: 00-16800	3. NOUN NOMENCLATURE: Helicopter				10. HOURS: 150	11. MILES: N/A	12. ROUNDS: N/A	13. STARTS: N/A
7. MAINTENANCE ACTIVITY	8. UTILIZATION CODE*: A	9. SELECTED ITEM: ☒ 1 YES ☐ 2 NO						

14. FAILURE DETECTED DURING (Select one - use 'x' or 'X')
☐ A SCHEDULED MAINTENANCE ☐ C TEST ☐ E STORAGE ☐ G FLIGHT
☐ B HANDLING ☐ D NORMAL OPERATION ☒ F INSPECTION ☐ H OTHER

15. FIRST INDICATION OF TROUBLE (Select one - use 'x' or 'X')
☐ 056 INOPERATIVE ☐ 258 OVERHEATING ☐ 126 OUT OF ADJUSTMENT
☐ 008 NOISY ☐ 387 LOW PERFORMANCE ☒ 000 OTHER

16. DESCRIBE DEFICIENCIES OR SYMPTOMS ON THE BASIS OF COMPLETE CHECKOUT AND DIAGNOSTIC PROCEDURE IN EQUIPMENT TM (Do not prescribe repairs)

SECTION II - WORK ACCOMPLISHED

17a. REPAIR ORGANIZATION | c. UNIT IDEN CODE | 18. TYPE ORGANIZATION/ACTIVITY ACCOMPLISHING WORK (Select one-use 'x' or 'X'): ☐ 1 TOE ☐ 2 TD ☐ 3 CONTRACTOR | 19. AMS ACT. CODE

b. LOCATION

20. a. FAILURE CODE*	b.	c. NOUN, SERVICE, OR MWO NO.	d. MFR. CODE	e. MANHOURS* (Hundredths)	f. FEDERAL STOCK NUMBER	g. QUANTITY	h. PARTS COST

TOTAL MANHOURS | TOTAL FLUIDS | TOTAL TOOLS | TOTAL MANHOURS COST | TOTAL PARTS COST

☐ 3 FACILITIES ☐ 4 FLUIDS ☐ 5 TOOLS

22. DELAY (Indicate one - use 'x' or 'X') ☐ 2 MANPOWER ☐ 3 PARTS
23. SUBMITTED | 24. RECEIVED | 25. WORK STARTED BY | 26. INSPECTED BY | 27. ACCEPTED BY
JULIAN DATE | JULIAN DATE | JULIAN DATE | JULIAN DATE | JULIAN DATE

SECTION III - EQUIPMENT IMPROVEMENT RECOMMENDATION (Select one-use 'x' or 'X')

29. NORMAL REASSEMENT ☐ 1 YES ☐ 2 NO
30. URGENCY ☐ A IMPROVE DESIGN ☐ C REVISE PROCEDURE ☐ B MODIFY ☐ D OTHER (Specify)
31. RECOMMENDATION
32. ORGANIZATION
33. FEDERAL STOCK NUMBER
34. NOUN NOMENCLATURE
35. OPINION OR REMARKS. DESCRIBE CONDITIONS UNDER WHICH FAILURE OCCURRED. ATTACH PHOTOGRAPHS, SKETCHES IF AVAILABLE.

None

1. Mfg parts number 000-000-000-0
2. Item serial number - none
3. TM number - TM 55-0000-000-34P, page 85, fig 15, index 3
4. Last overhaul date - N/A
5. Quantity inspected - 1

DA FORM 1 JAN 54 2407

Mr. Barthel, a Naval aviator during World War II, was engaged from 1949 through 1960 in stress analysis, development and engineering design of various aircraft systems and subsystems. Since 1960 he has been with the U. S. Army Aviation Systems Command, St. Louis, MO, as an aeronautical engineer. He is now the Deputy Director for Maintenance

MANY QUESTIONS have been asked and comments made regarding the Army Maintenance Management System (TAMMS), particularly that part responsible for Equipment Improvement Recommendations (EIRs). Following are typical examples:

"EIRs take too much time to fill out. All the details asked for couldn't possibly be of any value."

"When I submit an EIR, I seldom receive a reply; so why should I waste the time to fill out a Form 2407?"

"When I submit an EIR, all I get in response is a stereotyped statement that my reported deficiency is being entered into a statistical file for use in the design of future systems."

"Why submit an EIR on a component my maintenance manual says is a condition item? These are throwaway items."

"The replies I get tell me nothing. I don't care if they are establishing a case or considering my problem as an isolated case. I have a problem and I need a solution."

All these are logical comments that definitely warrant explanation, but they represent only one-half of the total picture. For the other half, we have to go to the National Maintenance Engineering Point where we hear comments such as these:

"The EIRs received do not provide enough technical information to make an engineering evaluation of the problem. How can I recommend corrective action when the component deficiency is not even described?"

"The problem always seems to be a component deficiency and never a deficiency in maintenance or servicing."

"Why are major field problems predominantly reported by general officer correspondence and not by EIRs? It's difficult to respond to a request for corrective action unless some history of past deficiency reporting has been established."

"I'm forced to consider the discrepancy as an isolated case because either there is not enough information to make an evaluation of possible causes of failure or the discrepancy is one of the first reported after thousands of hours of successful component operation."

Obviously, unless rapport exists between these two affected bodies—the using activity and the National Maintenance Engineering Point—we can expect problems. The situation becomes akin to a tug-of-war between individuals at each end of an elastic band. The harder they pull, the more the band stretches, and the further apart they get. In practice, this type of action destroys the efficiency of the EIR program and reduces its benefits. Mutual understanding of the EIR system and cooperation of the parties involved are, therefore, essential.

The Directorate of Maintenance (NMP) at the Aviation Systems Command (AVSCOM) is responsible for in-service engineering support of Army aircraft, including the correction of component deficiencies reported by EIRs. Hardware, however, may fail for many reasons. We are all familiar with the inherent design types of failures traced back to improper selection of parts, weak structural and mechanical elements, inadequate provisions for lubrication, and many others. Usually, by the time the aircraft is fielded, most of the design types of inadequacies have been eliminated. That's why, in most instances, extensive engineering and service tests are performed before a system is fielded. But in the process, we often overlook those elements of design or processing that make for ease of production, overhaul, maintenance and effective operational use. There are human considerations that sometimes result in failures not inherent to design.

The term "human error" generally means failure induced by fabrication, repair and maintenance personnel. The point is that human-induced failures are hard to detect, seldom are reported, recur with alarming frequency and are a major problem for which no tests can be developed to substantiate or minimize their occurrence. Knowledge of this type of failure, as well as failures from inherent design deficiencies after a system becomes operational, can only be obtained by correct, thorough and continuous field failure data feedback. And the main source for this data is through the EIR reporting system.

Significant gains can be achieved by improving

field-failure feedback data. Technical personnel who provide in-service engineering support to users need to know all available information about part failures reported, including information on excessive maintenance believed to be due to obsolete, confusing or incorrect maintenance instructions. But don't take it for granted that a mechanic with a failed part resting in his hand can't provide valuable information for determining failure causes. Problems identified on good EIRs often lead to correction of component deficiencies. For example, EIRs submitted on the UH-1/AH-1 main rotor hydraulic actuators indicated excessive leakage due to improper seals. This touched off a study on seals which led to the development of a seal that by test has exceeded 1,500 hours of operation leak free. These seals will soon be entering the supply system.

EIRs submitted on the AH-1 tail rotor cable indicated excessive wear due to lack of lubrication. A study indicated that the "wet lube" used would pick up contaminants (abrasives) which worked into the lay of the cable and caused inside wear. All "wet lube" has now been removed from the cables and they are sprayed with a "dry lube." Based on feedback to date this has reduced cable wear.

EIRs submitted on deterioration of the feathering axis bearing on the UH-1/AH-1 540 rotor hub resulted in a PIP for an elastomeric bearing design and, as an interim, a carbide-coated sleeve bearing now being introduced in the supply system.

Part of the tug-of-war is caused because mechanics never know that their EIRs are used until they receive a reply. When AVSCOM's replies to EIRs state that we concur with information submitted, that is not the end to the use of the EIR. In many cases, information submitted is used in replies to other EIRs concerning the same problem. Good information speeds up the process of providing replies. Good feedback data will go a long way toward improving the operational effectiveness of aircraft systems.

Just as important is the type of reply and follow-up action provided by the National Maintenance Engineering Point's technical personnel. Understandable, accurate and timely replies that address the submitters' questions are most important. This is true no matter how simple the deficiency reported may seem to be. But in many cases accurate and timely replies can't be provided until a PIP is initiated, funds are authorized, design changes recommended, ECPs approved, MWO kits procured and qualification tests performed that substantiate the change that corrects the deficiency.

To assure that each user who submits an EIR is recognized, AVSCOM sends an acknowledgment to the submitter's unit within 24 hours of receipt of his EIR. Indications are that some activities are not getting these acknowledgments down to the EIR submitter; but they are being sent by AVSCOM.

EIRs are first received at AVSCOM by the EIR Control Group located in the Directorate for Maintenance. This group assigns an AVSCOM control number and sorts EIRs by priorities (Emergency, Urgent and Routine). They are then assigned to the specific system project office responsible for the applicable aircraft. If the EIR is a quality problem or involves a publication, a copy is forwarded to either the AVSCOM Directorate for Product Assurance or the Technical Publications and Maintenance Data Division in the Directorate for Maintenance. In the meantime, all EIRs are microfilmed and an acknowledgment prepared and released to the sending activity. The copy of the EIR retained in the EIR Control Center is then used for key punching the EIR information into the automated data bank program. This data bank is used for establishing failure rates, reliability levels and justification for product improvement.

While all this is going on, the maintenance engineer in the specific aircraft system project office is evaluating the EIR, based on its priority and its content, to determine the following:

- If the EIR contains sufficient information to determine the necessary corrective action.
- If any previous EIR feedback data shows a similar deficiency and what corrective action was taken.
- If a case has already been established for the reported problem.
- If a computer reply is available for an immediate answer.
- If the priority is properly assigned in accordance with TM 38-750. (If the priority is not correct, it is changed to the proper designation.)
- If the information in the maintenance manuals, as well as past EIR Digest entries, are adequate for the reply. (Many EIRs submitted are found to have already been answered by EIR Digest entries. EIR Digests on aircraft are available in the field and are updated quarterly.)

If sufficient information and feedback historical data are available, a reply is prepared and forwarded to the EIR Control Group for release. EIR replies are entered in the data bank and concurrently released to the preparing field activity. To ensure responsiveness and management control of all EIRs, flasher monthly reports are required on the quantity

of open EIRs on hand from all system offices. These reports are cross-checked with the log in the EIR Control Center. The entire processing time for an EIR to be received at the AVSCOM EIR Control Center, logged in and placed in the maintenance engineering action office is less than 2 hours. This does not mean that you are going to get answers within 2 hours, but it does indicate an accurate control and procedure for recording the time required to respond to EIR inputs has been established.

During calendar year 1973, AVSCOM received and processed 11,136 EIRs. During calendar year 1974, 14,496 EIRs were received and processed. For the first 4 months of CY 1975 AVSCOM has received and processed 3,170 EIRs—a big reduction from the number received for the same period in 1973 and 1974. A considerable quantity of the recent EIRs are still open cases. This is due to justification of a Product Improvement Program, obtaining funds for expenditures to obtain an Engineering Change Proposal from the component manufacturer and then implementing the design change for the service-revealed deficiency of a specific component. Obtaining funds for PIPs, implementing design changes and purchasing MWO kits is a time-consuming process and is one of the major causes of delays in responding to customer-revealed deficiencies reported by EIRs.

The need for obtaining accurate failure data from user activities, including individual analysis of failed parts, cannot be overemphasized. A full description of the physical aspects of the failure is important for tracing possible failure modes or trends. The time since new and time since overhaul is also important in terms of determining time between failures. Circumstances prior to the difficulty sometimes give positive clues as to what could have happened to cause a failure. The lack of this type information generally results in extensive delays in providing EIR replies.

But despite our best efforts, all reported problems will not necessarily be resolved. This fact is not always understood or accepted by users and customer management. And even when causes of failures are known, corrective action may not be taken immediately if safety of flight is not affected. The reasons include cost, production lead time, supply posture of old parts, operational readiness factors and funding limitations for PIPs. Nevertheless, it still pays to mine and mill a ton of ore, so to speak, for an ounce of gold—even though all the gold may not be extracted.

Granted, no system is perfect. Today, for example, educators are in agreement that the present system of grading does not accurately reflect the knowledge each student has acquired. Nevertheless, some system for measuring a student's progress is necessary, and the present one is the best available. So it is with the EIR program. While it does not profess to be the ultimate, it is the best we have been able to devise. Yet, while it is not perfect, it is effective when all parties understand the system and help each other by doing their share.

In summation, proper use of EIRs is vital to the Army aviation maintenance program. Similarly, all information requested is necessary for determining causes and effecting cures. Recommendations submitted from the field are frequently adopted, and a reply is made for every EIR received. Because aircraft may be scheduled to be phased out, or funding limitations restrict improvements that do not affect safety, some EIRs are destined to be used only for statistical purposes. However, these EIRs are still valuable because they will ensure that the same types of deficiencies will not be incorporated in new designs.

Yes, it is important to submit EIRs on "condition" or "throwaway" items. If a seal, for example, is failing during its expected life span and no EIRs are submitted, no effort will be made to redesign it. The same would apply to bearings, bushings, actuators, etc. Consequently, we become stuck with a perpetual problem item. Finally, we are only human and subject to making an occasional administrative error. We may, for example, receive an EIR concerning the failure of some type of component that has been in the inventory for years, with no previous reported failure. Our reply to such an EIR may point out the lack of any established trend. Now, a week or two later, we may receive a similar EIR on the same type of component. Our reply to this one may be identical to that made concerning the previous one. What we may have inadvertently failed to note was that both failures may have occurred in the same unit, definitely establishing a need for additional action on our part. When we make such an oversight, *tell* us about it. We are not trying to "drop the ball." But remember, if a design change is required, money is involved and we then have to go through the PIP, ECP and MWO cycle.

While tug-o'-war may be a fun game and a recreational sport, it has no place in the EIR program. Your EIRs are important. They are needed and wanted at the AVSCOM National Maintenance Point. Keep them coming in!

USAAAVS

PEARL'S

Personal Equipment & Rescue/Survival Lowdown

If you have a question about personal equipment or rescue/survival gear, write Pearl, USAAAVS, Ft. Rucker, AL 36362

Care and Maintenance of LPU-10/P Underarm Life Preserver

Are you confident that your life preserver will work if you should need it? You can be if you have performed all of the following required maintenance and proper timely inspections on your preserver.

A preflight or daily inspection of the life preserver will be made before the first flight each day. This is a visual inspection for holes, tears, oil and grease. Also check the harness for wear and the condition of stitching. Make sure the closure pin is properly installed and the safety thread intact.

An inflation test of the flotation cells should be made prior to issue and each 90 to 120 days thereafter. If the flotation cells are 4 years old or older (check date of manufacture), they will be inspected every 90 days to ensure serviceability. Once a year a random sampling of 5 percent of all preservers will be inflated by CO_2 (cylinder, carbon dioxide, NSN 4220-00-543-6693) to ensure proper functioning of the CO_2 inflation system. Any evidence of failure of any one sample will require CO_2 inflation inspection of all life preservers being inspected. However, ensure that those preservers being CO_2 inflation tested have not been CO_2 inflated within 1 year. Repeated CO_2 inflations can induce leakage due to cold cracking of the cell.

CO_2 cylinders should be weight checked before installation in inflators, using scales, NSN 6670-00-530-1114 or 6670-00-530-0996, calibrated in grams. Cylinders weighing less than the gross weight marked on the cylinders will be removed from service and condemned.

Upon completion of periodic inspection and test, each cell shall be marked to indicate date of inspection, using ¼-inch-high letters. Mark the date and location of the inspection or test. If a CO_2 inspection has been performed, add CO_2 INSP.

Yes, punctures, cuts or tears measuring less than one-half inch in length may be patched, using neoprene cement, Military Specification MIL-C-5540, Type II. The patches shall be round and fabricated from cell material. They must be large enough to extend more than 1 inch beyond each side of the hole. No more than two patches are allowed per cell. Be sure to perform an inflation test after the patch has cured.

Service life on both harness and cells is dependent on condition rather than age. If major defects are found or if inspections indicate doubt of adequate protection of personnel, replace the doubtful cells.

CO_2 cylinders are used to inflate the cells of pneumatic life preservers. The pressure within these cylinders increases in direct proportion to temperature rise. Therefore, these preservers must never be stored in areas (aircraft cockpits, supply storage rooms, etc.) exposed to direct sunlight or high ambient temperatures. The CO_2 cylinders may explode.

Enlisted Sew-on Insignia

Enlisted personnel are authorized optional wear of subdued sew-on grade insignia on the field and work uniform in lieu of the subdued pin-on insignia. The sew-on insignia should now be available in post exchanges. The Nomex flight suit is considered a work uniform.

Replacement of Cuffs, Waistbands and/or Collars for Flight Jackets

Supply Information Letter No. 1-75, U. S. Army Support Center, Philadelphia, PA, lists the following guidance for replacement of cuffs, waistbands and/or collars for flight jackets, NSN 8415-00-817-0597 (S), NSN 8415-00-818-9133 (S) and NSN 8415-00-270-0367 (S).

As requirements materialize, submit funded MILSTRIP requisitions to the Defense Personnel Support Center (RIC S9T).

ITEM	NSN	UI	U/P
Cuffs	8315-00-275-2870	EA	.51
Waistbands	8315-00-275-6195	EA	1.21

Two collars can be fabricated from the above waistband.

When replacing any one of the three items, rip the seam, remove the old item and replace with the new item, using the same stitch that was originally applied. Make certain the stitch overlaps the old stitch by 1½ inches on each side of the collar. For cuffs and waistband, back stitch 1½ inches to assure it does not ravel.

USAASO Sez

The U. S. Army Aeronautical Services Office discusses

MVA—Modern Volunteer Army? No—not this time! This time we are talking about minimum vectoring altitudes.

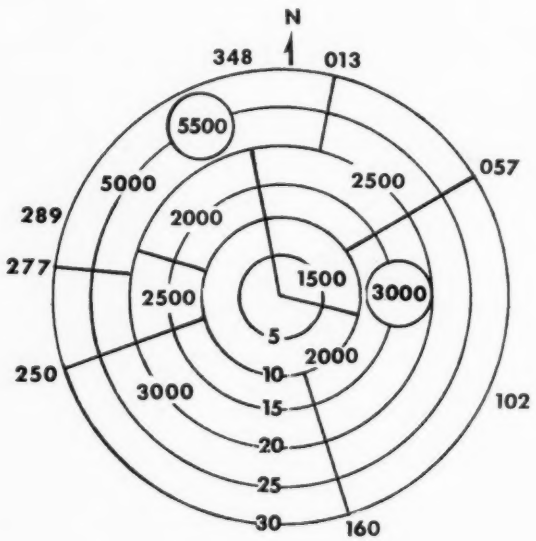
The Federal Aviation Administration (FAA) has had considerable success in using MVAs. For example, controllers are able to shorten flights and, thus, conserve fuel by vectoring aircraft on more direct routes where there are no minimum enroute altitudes. They have also been more effective in assisting aircraft in distress by providing minimum altitude information to the pilot who may be flying over unfamiliar terrain.

Because of the FAA's success, the Director, Air Traffic Service has requested that the following information be passed on:

MVAs are established for use by ATC when radar air traffic control is exercised. MVA charts are prepared by air traffic facilities at locations where there are numerous different minimum IFR (instrument flight rules) altitudes. Each MVA chart has sectors large enough to accommodate vectoring of aircraft within the sector at the MVA. Each sector boundary is at least 3 miles from the obstruction determining the MVA. To avoid a large sector with an excessively high MVA due to an isolated prominent obstruction, the obstruction may be enclosed in a buffer area whose boundaries are at least 3 miles from the obstruction. This is done to facilitate vectoring around the obstruction.

The minimum IFR altitude (this is also the MVA) in each sector is determined by applying the provisions of FAR 91.119 (a) (1,000 feet or 2,000 feet above obstruction). Where lower MVAs are required in designated mountainous areas to achieve compatibility with terminal routes or to permit vectoring to an instrument approach procedure, 1,000 feet of obstacle clearance may be authorized in lieu of 2,000 feet. Air traffic facilities will establish a higher MVA whenever the minimum IFR altitude does not provide at least 300 feet above the floor of controlled airspace.

Because of differences in the areas considered for MVA, and those applied to other minimum altitudes, and the ability to isolate specific obstacles, some MVAs may be lower than the non-radar MEAs/MOCAs (minimum enroute altitudes/minimum obstruction clearance altitudes) or other minimum altitudes depicted on charts for a given location. While being radar vectored, IFR altitude assignment by ATC will be at or above the MVA.



BG William W. Ford

BG O. Glenn Goodhand

COL J. Elmore Swenson

New
Army Aviation Hall of Fame
Inductees

SEVEN MORE NAMES were added last June to the Army Aviation Hall of Fame display in the U. S. Army Aviation Museum at Fort Rucker. The new inductees represent four important periods in Army aviation's history.

The period prior to 1942 is represented by Brigadier General (Ret.) William W. Ford. As a lieutenant colonel, he envisioned the use of light aircraft to provide an "Air Observation Post" for artillery fire adjustment.

Brigadier General (Ret.) O. Glenn Goodhand is honored for the period 1942 to 1949. He was prominent in expanding the World War II role of Army aviation.

The period 1942 to 1949 also is represented by the late Colonel (Ret.) J. Elmore Swenson for his efforts in revitalizing the Army aviation program after World War II.

Lieutenant General (Ret.) John J. Tolson III is recognized for the period 1950 to 1959. General Tolson is credited with the development of the first doctrine and the subsequent publishing of the field manual covering the tactical employment of Army transport aviation on the battlefield.

Mr. Arthur and Mrs. Dorothy Kesten also represent the 1950 to 1959 time period. They were instrumental in establishing the Army Aviation Association of America (AAAA).

The more recent period, 1960 to 1969, cites the late Major Charles L. Kelly. Also recognized for this period is Chief Warrant Officer (W4) Michael J. Novosel. Both were awarded the Medal of Honor because of their air evacuation efforts during combat operations in the Republic of Vietnam.

These seven new members of the U. S. Army Aviation Hall of Fame join the original seven who were inducted in June 1974 (see page 24, August 1974 ***DIGEST***). Features similar to those carried by the ***DIGEST*** during the past year on the original inductees will be printed in future issues.

LTG John J. Tolson III

Dorothy & Art Kesten

MAJ Charles L. Kelly

CW4 Michael J. Novosel

PEARL models the inflated LPU-10/P underarm life preserver, NSN 4220-00-850-8655

U. S. Army users of this life preserver will adhere to daily/preflight and periodic inspection procedures contained in chapter 1, section VI, TM 55-1500-204-25/1, dated April 1970 w/changes, entitled "General Aircraft Maintenance Manual." If additional information is required on the inspection procedures for LPU-10/P life preservers, write Commander, U. S. Army Troop Support Command, ATTN: AMSTS-MMM (Mr. Norris), 4300 Goodfellow Blvd., St. Louis, MO 63120, AUTOVON 693-2474. Operational failures of life preservers should also be reported to this address.

This is the twelfth of 12 back covers designed to show personal survival, rescue and protective equipment. Detach this cover for your bulletin board display of the more important survival and protective equipment available to crewmembers.

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